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Iroquois Paper Co. Acquires Thomson Mill

Plant of the Bankrupt Iroquois Pulp and Paper Co. Is Bought By Thomas R. Remsen and Others At A Price Which Has Not Been Revealed — The Property, Long Idle, Will Be Used For the Manufacture of Newsprint.

[FROM OUR REGULAR CORRESPONDENT]

THOMSON, N. Y., July 6, 1937—Among the most prominent real estate transactions in Washington County in recent years was one consummated last week between the First Trust Company, of Albany, trustee of the bankrupt Iroquois Pulp and Paper Company of this village, and the Iroquois Paper Company, of New York, with transfer of the bankrupt mill and other properties here to the latter concern. Deeds of the property which have been recorded in the office of the County Clerk indicate that the transfer of property to the New York company is subject to two mortgages of the bankrupt concern which do not exceed $245,000. The amount of money involved in the purchase of the property was not revealed. The Iroquois Pulp and Paper Company went into bankruptcy in 1932 and the mill has been idle since that time. The new company was incorporated in May of this year under state laws and plans to deal in newsprint paper, printing machinery and supplies. Directors of the concern listed in the incorporation articles are John D. Coffin, Raymond P. McCauley and Robert O. Sternberger, of New York. Principal shareholders are Thomas R. Remsen, Henry S. Howard and Hazel W. Bigelow, all of Hudson Falls. When operations will be resumed at the plant has not yet been announced.

Middletown Paper Shipments Increase

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, July 6, 1937—The pooled tonnage of paper shipped from Middletown during the month of May represented an increase of 16.7 per cent over that forwarded the same month last year, according to figures released by G. R. Braun, secretary of the Miami Valley Paper Shippers' Association, during the past week.

The figure includes on the pooled tonnage less than carload lots, and not the entire output of manufacturers.

The association, consisting of 24 manufacturers in the Miami Valley, including Dayton, pooled 12,732,000 pounds during May of this year against 10,910,000 in May, 1936, the report stated.

Manufacturers agree that this represents a most substantial increase and they expressed gratification over the results.

Most of the Miami Valley mills have been busy for many months. A Dayton motor transportation company the other day reported eight large trucks filled with paper, envelopes and paper-cutting machinery were shipped out of this city to Western points in one afternoon. The "bottoms" were empty up to the noon hour of that day, and rush orders were phoned after that hour. Before night all shipments had been picked up for the Western trip, including the heavy machinery which was sent to Chicago by the Seybold Company.

This incident indicates the drift of trade. "We cannot get enough paper for the Central Western trade," remarked the motor official. "There must be a tremendous demand for paper of various grades and uses."

Outagamie Paper Co. Mill Sold

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—The Outagamie Paper Company mill at Kaukauna, Wis., was sold to the city of Kaukauna at a sheriff's sale at Appleton, Wis., last week. The city was eager to obtain the desirable water power rights included in the transaction, and bought the property on a bid of $4,850, plus the back taxes. The company owed approximately $80,000 in back taxes, of which Kaukauna had about $20,000 due its treasury. Two other bids were entered, one by Attorney Heber H. Pelkey, who did not reveal for whom he was acting, and the First Trust Company of Appleton. The mill has been idle for several years.

To Be Known As North Carolina Pulp Co.

The sulphate pulp mill which Kieckhefer interests are building at Plymouth, N. C., and which will be known as the North Carolina Pulp Company as soon as the plant is in operation, will have as local manager, W. W. Henderson and as superintendent W. M. Cary. The mill will have three 120-inch wet machines and six digesters. The capacity will be 600,000 pounds in twenty-four hours. It is expected that the mill will be in operation September 15.

The plant has Atlantic Coast Line and Norfolk Southern railroad sidings into the plant.

Gilbert Co. To Celebrate 50th Anniversary

Will Entertain Customers At Business Conference and Golfing Party July 14 - 15 — Wisconsin Paper Men Fight Higher Rates on Shipments — Creditors Respond To Patten Paper Co. Proposed Reorganization.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—Gilbert Paper Company, Menasha, Wis., will celebrate the fiftieth anniversary of its founding July 14 and 15. In observance of that event, the company is planning to entertain a group of customers at a business conference and golfing party.

Last week the company entertained seventy employing printers of Milwaukee, Wis., with an inspection trip of the mill, a luncheon and golf at the North Shore Country Club, and a banquet. Frank J. Schneller, sales manager, was in charge.

All employees of the Gilbert mill were given a week's vacation starting Saturday, July 3, with pay. The mill was closed down for the week, in accordance with a new policy, and pay checks for the week in advance were issued to each worker.

The Edgewater Paper Company, Menasha, Wis., also closed down for a week, with full pay for the employees. A third mill, the George A. Whiting Paper Company, Menasha, shut down for a week for repairs. Practically all of the mills of the Fox River Valley ceased operations Saturday, July 3 for the holiday period and resumed Tuesday morning, July 6.

Fight Higher Rate on Pulpwood

Wisconsin Paper and Pulp Manufacturers Association, through J. E. Bryan of Chicago, as spokesman, put up a stiff fight before the Wisconsin Public Service Commission at a hearing at Madison, Wis. last week on the attempt of railroads to demand increased rates on pulpwood shipments. Michael J. Anuta of Menominee, Mich., representing the Badger Paper Mills, Inc., Peshtigo, Wis., also spoke on behalf of the mills.

The commission deferred its decision indefinitely, although it agreed to lower the rates tentatively. Principal arguments of railroad spokesmen were that the rates adopted in 1922 had become established through long use and that the carriers are not making any money on present rate schedules.

Paper mill representatives contended the future existence of the pulpwood industry in Wisconsin is threatened by continuance of the old rates. Pulpwood trees, they said, have been greatly reduced in areas reached by single railroads and competition from Pacific coast and southern mills is growing stronger.

At previous hearings the commission had received factual testimony and had tentatively fixed lower rates which had not gone into effect prior to the hearing. On the basis of these data, the commission issued the following statement:

"The paper industry is shown by record to be the fourth largest industry in Wisconsin in point of value and in point of production. Wisconsin ranks fourth in the United States in the production of paper and also ranks high in the production of wood pulp.

"In addition to the vast amount of outbound tonage, the production of pulp and paper creates a large movement of inbound raw materials including pulpwood, lime, sulphur, limestone, coal, chemicals and various other commodities used to produce pulp.

"It requires from 6.5 to 10 cars of raw materials to manufacture one carload of paper. This varies because of the different methods of manufacture at various mills.

"Twenty-six mills in various parts of the state use pulpwood, and it is indicated that the freight charges are a very substantial part of the total cost of pulpwood and that mills compelled to ship over two or more lines of railroad are at a disadvantage because of the joint rate in comparison with the mills that are able to obtain their pulpwood on a single-line haul.

"The pulpwood supply has greatly diminished and each year the mills are forced to go farther afield and in many cases must now ship via two or more lines of railroads.

"The present level of joint rates, is said to have driven much of the pulpwood movement to truck. During 1935 paper mills in Wisconsin used 252,648 tons of pulpwood originated in Wisconsin and shipped to Wisconsin destinations, of which 100,088 tons moved on joint line rates.

"Total amount of pulpwood received by Wisconsin paper mills from all sources for 1935 was 866,017 tons. Pulpwood requirements for 1936 were estimated to have been substantially greater than for 1935.

"The record indicates that there has been some curtailment in the production of wood pulp in Wisconsin and that the mills are operating at about 75 per cent of normal capacity due to the large amount of wood pulp being imported from foreign countries and which is sold in Wisconsin at a price lower than the Wisconsin manufacturer can produce it.

"Any curtailment of wood pulp production in Wisconsin results in a loss of business to the Wisconsin producer and a subsequent loss in tonnage to the railroads as well."

Joint line rates on pulpwood were last revised in 1922 and provide a 1.1 cent addition per 100 pounds for joint-line movements over the rate for single-line and 2 cents additional for shipments over three or four lines.

Paper mills ask a reduction equal to $6 per car of pulpwood. The effect would be to reduce the present average of $7.50 per car charge for transfer from one railroad to another to $1.50.

On the basis of testimony already taken, the commission indicated that the present $7.50 charge is too high, while the $1.50 charge asked would be too low. The commission fixed a rate of approximately $3.75 per car of 70,000 pounds for transfer from one railroad to another.

Patten Paper Co. Reorganization

What response creditors made to the proposal for the reorganization of the Patten Paper Company, Ltd., Appleton, Wis., in proceedings under section 77B of the United States Bankruptcy Act were to be

made known at a hearing scheduled July 7 before Francis J. Hart, special master, at the federal building at Milwaukee. Materiality of any amendments to the plan or any new amendments offered also will be considered. The petition also was to be considered of the Marine National Exchange Bank, Milwaukee, as depositary of Northern Paper Mills stock, for the return of this stock to the depositors. The stock represented collateral to secure obligations of the Judson G. Rosebush interests.

Employment and Wages

Employment and wage progress in Wisconsin paper and pulp mills is shown by figures issued by the United States Department of Labor. Taking the average of the years from 1923 through 1925 as 1,000, employment in the mills stood at 1,201 for the month of May, 1937, in April 1,191, and in May of last year, 1,094. May payrolls on the same basis stood at $1,218, in April $1,196, and in May of last year, $963.

Flood Control for Fox River Valley

Efforts to obtain reservoirs and flood control for the Fox River Valley are being continued by the Association for the Relief of High Water and the officials of the cities which will benefit. An adverse report by a board of army engineers has been protested by Senator F. Ryan Duffy of Wisconsin, and permission has been granted to file appeals up to September 1. The project would place a series of reservoirs and dams on the Wolf River to hold back the water supply for the Fox River until needed at low stages. Mayors of the affected cities have held conferences on further procedure.

Hourly Employees Form Separate Union

Hourly employees of the Kimberly-Clark Corporation's mill at Kimberly, Wis., have formed an independent labor union, with more than 500 members enrolled to date. The union intends to elect officers, and enlarge its membership sufficiently to become recognized as representing the majority of employees.

C. L. Henderson Sr. Gets Patent

Charles L. Henderson, Sr., long in the engineering organization of the Kimberly-Clark Corporation at Neenah, Wis., has been granted a U. S. patent for an apparatus for coating printing cylinders. The device comprises a rotatable table mounted so as to support a horizontal cylinder through which a sensitized solution may be applied during rotation. The application was filed in October, 1935, and was approved as to 14 features of originality and improvement. Commercial rights are assigned to the Paper Patents Company, Neenah, Wis.

Must Make Tax Returns

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 7, 1937—Delinquent employers in the paper industry have been advised by Commissioner of Internal Revenue Guy T. Helvering to make immediate tax returns as required under the provisions of Titles VIII and IX of the Social Security Act to avoid further payment of drastic penalties which are now accruing.

Commissioner Helvering pointed out that every person employed in the paper industry came under the provisions of Title VIII, which imposes an income tax on the wages of every taxable individual and an excise tax on the pay roll of every employer of one or more. This tax is payable monthly at the office of the Collector of Internal Revenue. The present rate for employer and employee alike is one per cent of the taxable wages paid and received.

Under Title IX of the Act, employers of eight or more persons must pay an excise tax on their annual pay roll. This tax went into effect on January 1, 1936, and tax payments were due from the employers, and the employers alone, at the office of the Collector of Internal Revenue on the first of this year. This tax is payable annually, although the employer may elect to pay it in regular quarterly installments.

The employer is held responsible for the collection of his employee's tax under Title VIII, the Commissioner explained, and is required to collect it when the wages are paid the employee, whether it be weekly or semi-monthly. Once the employer makes the one per cent deduction from the employee's pay, he becomes the custodian of Federal funds and must account for them to the Bureau of Internal Revenue.

This is done, Mr. Helvering said, when the employer makes out Treasury form SS-1, which, accompanied by the employee-employer tax, is filed during the month directly following the month in which the taxes were collected. All tax payments must be made at the office of the Collector of Internal Revenue in the district in which the employer's place of business is located.

Penalties for delinquencies are levied against the employer, not the employee, the Commissioner pointed out, and range from 5 per cent to 25 per cent of the tax due, depending on the period of delinquency. Criminal action may be taken against those who willfully refuse to pay their taxes.

The employers of one or more are also required to file Treasury forms SS-2 and SS-2a. Both are informational forms and must be filed at Collectors' offices not later than next July 31, covering the first six months of the year. After that they are to be filed at regular quarterly intervals. Form SS-2 will show all the taxable wages paid to all employees and SS-2a the taxable wages paid each employee.

Participation in a state unemployment compensation fund, approved by the Social Security Board, does not exempt employers from the excise tax under Title IX, Commissioner Helvering said. Nor does the fact that there is no state unemployment compensation fund relieve the employer of his Federal tax payments. In those states where an unemployment compensation fund has been approved, deductions up to 90 per cent of the Federal tax are allowed the employer who has already paid his state tax. These deductions are not allowed unless the state tax has been paid.

This tax is due in full from all employers in states having no approved fund. The rate for 1936 was one per cent of the total annual pay roll containing eight or more employees, and for 1937 it is two per cent. The rate increases to three per cent in 1938 when it reaches its maximum. The annual returns are made on Treasury form 940.

An employer who employs eight or more persons on each of twenty calendar days during a calendar year, each day being in a different calendar week, is liable to the tax. The same persons do not have to be employed during that period, nor do the hours of employment have to be the same.

Ontario Signs Agreement With Abitibi Co.

Settlement Regarding Timber Limits and Power Plants Remove Major Obstacle in Lengthy Reorganization Proceedings — Although Demand Has Slackened Nearly All Mills Are Busy—Kraft Prices May Advance.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., July 6, 1937—Signing by the Ontario Government of the agreement with Abitibi Power and Paper Company regarding timber limits and power plants removes a major obstacle in the progress of the lengthy reorganization proceedings. One notable feature of the agreement is that the Government may pass opinion on the reorganization. In view of this provision, particular significance is attached to the remark of Premier Hepburn that the Government is only interesting itself to the extent to which timber limits are involved. It is understood that the Government is likely to avoid the contentious features dealing with distribution of new securities. The preferred shareholders' committee has aligned itself in favor of the reorganization plan that will be presented shortly by the bondholders' committee, headed by Joseph P. Ripley, president of Brown, Harriman & Co., New York.

Holders of substantial blocks of preferred stock appear likely to dissent from the bondholders' plan and to favor the proposals recently brought forward by the liquidator, R. S. McPherson, C. A., Toronto. It is understood that Wood, Gundy & Co. for preferred stock and Collen Brooks, who represents the Rothermere common stock interests in Abitibi, are the major share holding groups leaning toward the liquidators' plan. There are thus two major alternatives—the bondholders' plan of reorganization by judicial sale, and the liquidators' of compromise under the Companies' Creditors' Arrangements Act. The followers of each plan would like to see the other side give way. In the meantime it appears as if the Abitibi "scramble" had just commenced.

Good Volume of Business in Progress

Although business has slackened off somewhat during the past few weeks there is still a good volume of trade coming the way of the paper jobber and nearly all of the mills are busy. For instance wholesalers are finding it increasingly difficult to get delivery of book papers from the mills and manufacturers are at their wits end trying to provide any kind of a service for the paper merchants. Some mills are weeks behind with their orders from jobbers and all the manufacturers of book papers can do is to keep the publishing industry supplied. Mills are not quite so busy in other lines such as bonds, writings and ledgers but there has been an increased demand for coated stock and mills making this line of paper are much busier than they were a few weeks ago. Were it not for the presence of the holiday season all lines of fine papers would likely be enjoying the steady improvement that has been in progress for some months past.

Reflecting the condition existing in the envelope trade the demand for envelope papers is rather light just now. The call for both special and standard lines of envelopes is comparatively small just now although there are signs of a picking up in business now that prices have become more stabilized.

Advance in Kraft Likely

Despite the prospect for higher prices on kraft paper there has only been a small stocking up by distributors of coarse papers. It seems very likely that prices of kraft, particularly, will advance within a few weeks and there are already signs of a strengthening market. Most lines of wrapping have been enjoying fairly good business during the past several months.

Business with the light weight paper manufacturers and jobbers continues on a satisfactory basis with a good demand for towels, toilets and specialty tissue lines generally. There is also a good call for Canadian-made blanks, blottings and tag manillas.

Pulpwood Loaders Return To Work

After a brief strike for higher wages, pulpwood loaders were back at work last week on a new wage rate at the Spanish River mill of the Abitibi Power and Paper Company. Six or seven men, said to have organized the strike, remained off duty. The others accepted a scale of 40 cents an hour in place of the scale of 30 cents a cord. Good loaders, it is estimated, could make up to $5 under the cordage system.

R. I. Finlay Visits British Isles

R. I. Finlay, head of the United Paper Mills, Ltd., Toronto, is spending three months in the British Isles, during which time he will visit leading paper mills and wholesalers in that country.

Bowater's Paper Mills Sign Option

Bowater's Paper Mills, Ltd., British newsprint firm, acting on behalf of themselves and Edward Lloyd, Ltd., have signed an option agreement with the receiver of the Reid Newfoundland Company for acquisition of the Reid Co.'s timber limits in Newfoundland, it was learned last week. Financial circles understood the English companies planned to build sulphite pulp mills in Newfoundland if the deal finally materializes.

Industrial Paper Opens New Quarters

[FROM OUR REGULAR CORRESPONDENT]

Philadelphia, Pa., July 6, 1937.—The Industrial Paper Company, Baltimore, Md., with Eugene H. Lazenby as head, announces the opening of its new quarters at 613-15 West Pratt street.

The company, formerly located at 503 Water street, has leased a three-story building at the Pratt street address and is now occupying these new headquarters which has all modern facilities, having undergone complete renovation featuring many new improvements. The company was organized 17 years ago, and due to the steady progress enjoyed over this period, it has outgrown the old location.

Fine Paper Manufacturers Report More Sales

Business In Philadelphia, However, Is Handicapped By Labor Trouble Among Truck Drivers — Radical Decline In Quotations For A Number of Varieties of Waste Papers Causes Some Concern — Other Trade News.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., July 6, 1937—With a fomented strike that was city-wide among truck drivers this past week, and the three-day holiday intervening, business in the paper trade here, although not affected by the strike, was more or less sporadic as far as deliveries were concerned.

Fine Paper Sales Increase

Manufacturers of fine papers report total sales for June were higher than May. Manufacturers likewise report growing sales as July advances for specialties. And while there is the seasonal falling off, due to inventory period, etc., customers report steadier buying by consumers for daily requirements.

The demand for hot weather specialties has set in as dealers are called on for picnic goods, drinking cups, fancy doilies, tablecloths, spoons, napkins and towels, which are being offered in widening variety of designs and are proving profitable sellers.

Waste Paper Prices Show Decline

The paper stock dealers, whose condition during the first part of this year has been infinitely better than for several years past and thereby placing them on a profitable basis, are very much disturbed over the sinking of prices this week for mixed papers, old corrugated and folded news.

Mixed papers have reached the low level of 25 to 27½ cents; old corrugated 52½ to 55 cents, while folded news is 27½ to 30 cents.

For the entire line of soft and hard white shavings and other book stock of the better grades, mill prices remain unchanged, with a willingness to take virtually all that is offered at existing prices—none too high the packers declare—but with comparatively small volume of stock coming in.

A leading merchant in the waste paper industry states that just what the net effect will be cannot be determined, and although it is natural at this time of the year for demand to slacken, and mills not having a great many orders taking advantage of inventory periods to make necessary repairs to equipment—the recession in prices on the grades named to such low levels—so low in fact that there is scarcely a chance of packers eking out a profit in handling such stock —there has resulted drastic curtailment of collections and a consequent decrease in the available supply reaching the market.

Greater Interest Looked For

This, to all appearances, seems to be the only solution for the market under prevailing circumstances. With the falling off of supplies, it is contended the hopeful aspect of the situation lies in the fact there will be greater buying interest exhibited by consumers, and this of necessity will tend to stimulate prices.

Mrs. Doris Lewis on Vacation

Mrs. Doris Lewis, executive secretary of the Philadelphia Paper Trade Association, is spending this week of her vacation playing golf at nearby Country Clubs. Mrs. Lewis, who is an enthusiastic piscatorial devotee, expects to join a 2-day fishing party at Beach Haven.

Frank Seltzer in Hospital

Frank Seltzer, manager of the Envelope Department of Garrett-Buchanan Company, is in Lankenau Hospital where he underwent an operation for gallstones. His many friends in the paper trade will be glad to know he is satisfactorily convalescing, and expects to leave the hospital in about ten days.

H. D. Wells Gets Deinking Patent

H. D. Wells, Glens Falls, N. Y. has just been granted a United States patent on a method of deinking waste paper.

The Deinking Process for producing clean white high quality pulp of great strength from waste printed papers, is an automatic and continuous mechanical and chemical process, provided by a simple and low cost system of APMEW Machines. At the beginning of the deinking system the waste papers after being dusted are pulped, defibered, deinked and screened through very fine screen plates with .074 inch perforations in a single machine having a weak detergent solution. This finely deinked pulp of clean even texture is then washed and bleached and then ready for making into strong high quality bleached papers.

Through the thorough defibering, deinking and fine screening, high quality pulp of fine even texture without flakes is produced. The selected economical proportions of waste papers, detergent and water are automatically regulated and maintained uniform.

Great savings, it is said, are effected. Fifty per cent or more of the detergent is recovered and reused. Unusually low power costs are effected by using Diesel engines, which furnish all heat needed in process. By a novel use of warm water, no steam is used. The system is automatic and continuous and the maximum savings in labor and other costs are effected.

American Paper Machinery and Engineering Works, Inc., Glens Falls, N. Y. manufacture and license the deinking system for U. S. A.; and it is manufactured and licensed in Canada, where Paper Mill Equipment Ltd., Montreal, P. Q. are representatives.

Pulp Shipments Arrive at Albany

ALBANY, N. Y., July 6, 1937—Among the vessels docking at the local port last week were the Karpfanger and Ivar with large consignments of pulp wood from Sweden. Both carried several thousand tons and the work of unloading was started immediately. It is understood that both shipments are for the Hudson Falls plant of the Union Bag and Paper Company.

Financial News of Pulp and Paper Industry

Mosinee Paper Mills Co. Reports Profits of $250,000 for Fiscal Year Ending In May — Mead Corp. Earns $1.67 Per Share on Common Stock — Masonite Corp. Earnings Increase 44 Per Cent Over Last Year.

New York Stock Exchange

High, Low and Last for the Week Ending July 7, 1937

	High	Low	Last
A. P. W. Paper Co.	7⅛	7⅛	7⅛
Armstrong Cork Co.	63	61½	61¾
Celotex Corp.	43¾	42	43¾
Celotex Corp., pf.	76½	75	76½
Certain-Teed Products Corp.	14⅜	13	14
Certain-Teed Products Corp., pf.	56	53	56
Champion Paper & Fibre Co.	60½	56	60½
Champion Paper & Fibre Co., pf.	107⅞	107⅞	107⅞
Congoleum-Nairn Co.	37½	36½	37½
Container Corp. of Amer.	30⅝	28½	29⅝
Continental-Diamond Fibre Co.	19¾	18½	19¾
Crown Zellerbach Co.	19⅞	18	19⅞
Crown Zellerbach Co. cum. pf.	99½	99½	99½
Flintkote Co.	30⅞	28½	30¾
International Paper & Power (a)	18¾	17	18¾
International Paper & Power (b)	13¼	11¾	13¼
International Paper & Power (c)	7	6¾	7
International Paper & Power, pf.	103	98¾	103
Johns-Manville Corp.	129½	124	128½
Johns-Manville Corp., pf.	123¼	123¼	123¼
Kimberly-Clark Corp.	38	38	38
Masonite Corp.	56	50	56
Mead Corp.	31	26	30⅜
Mead Corp., pf.	97	95	97
Paraffine Companies, Inc.	65½	63¼	65½
Scott Paper Co.	40¾	39	39
Sutherland Paper Co.	33	31	33
Union Bag & Paper Corp.	76	72	76
United Paperboard Co.	11⅛	9⅞	11
U. S. Gypsum Co.	110	106	109
U. S. Gypsum Co., pf.	164	162	163

New York Curb Exchange

High, Low and Last for the Week Ending July 7, 1937

	High	Low	Last
American Box Board Co.	19⅛	18⅞	19
Brown Co., pf.	80	76½	80
Great Northern Paper Co.	40	39	40
St. Lawrence Corp.	12	11½	12
St. Regis Paper Co.	⅞	¾	¾
St. Regis Paper Co., pf.	105	104½	105
Taggart Corp.	11¼	10½	10½

Mosinee Paper Mills Earn $250,000

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—Net profits of approximately $250,000 for the fiscal year ending May 31 were reported to stockholders of the Mosinee Paper Mills Company, Mosinee, Wis., at their annual meeting held last week at the Wausau Club, Wausau, Wis. Gross sales were reported as $2,600,000 for the year.

Although these earnings showed considerable improvement over the previous year, the company continues to show a deficit in its operating surplus due to the heavy losses sustained during the depression, officials stated.

Sales and production were the largest in the company's history, and the company expresses confidence of a substantial year ahead.

The financial statement shows a strong current position, after having been adjusted to the reorganization plan approved by the federal court under section 77B of the United States Bankruptcy Act. Current assets show $1,071,129.44, as compared to $905,359.78 the previous year. Current liabilities are $184,053.51, as compared with $541,638.43 last year.

Payments of bond and trust note interest are being made regularly, but no dividends have been paid on common stock since 1930. Under the trust indenture no dividends can be paid on common until the outstanding bonds are reduced to $1,000,000. The present total of outstanding bonds is approximately $1,300,000.

All officers and directors were reelected, including the following: A. P. Woodson, Wausau, president; George L. Ruder, Wausau, vice-president; N. S. Stone, Mosinee, secretary and general manager; A. L. Krautzer, Wausau, treasurer, and W. H. Knoedler, Mosinee, assistant secretary-treasurer; directors: H. M. Thompson, Milwaukee; John M. Lull, Wausau; H. L. Dessert, Mosinee, and J. D. Mylrea, Rhinelander.

Mead Corp. Earns $1.67 Per Share

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, July 6—The Mead Corporation after allowance for preferred stock dividends for the six four-week periods ended June 12, 1937, reports an earning of $1.67 per common stock share of which there are 619,374 shares outstanding. This is compared with earnings per share during the corresponding period of the previous year of 53 cents.

One of the reasons given for the large increase over last year is due to the fact that the 1937 figures include the operations of Dill & Collins, Inc., which were not consolidated in the corresponding period of 1936.

The 1937 figures do not include an estimate of Federal surtax on undistributed profits.

The net income for the six four-week periods amounted to $1,157,570 and compared with $404,616 during the previous like period.

The sales up to June 12, 1937, totaled $13,104,749, which compared with $7,886,735 in the corresponding period of one year ago.

Assessments for Reservoir

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., July 6, 1937—Assessments for 1937 levied against paper mills and other concerns for construction of the Sacandaga Reservoir show, Finch, Pruyn & Co. among the largest taxpayers. The reservoir was constructed by the state at an estimated cost of $12,000,000 and its impounded waters have already been of benefit to paper mills by allowing operations during drought periods. The assessments are as follows for construction: Finch, Pruyn & Co., $22,326.49; Moreau Manufacturing Company, $852.16; International Hydro-Electric Corporation and International Paper Company, Town of Queensbury, $59,480.49. Town of Luzerne, International Hydro-Electric Corporation and International Paper Company, $1,349.25; New York Power and Light Company, $8,109.68; International Hydro-Electric Corporation and International Paper Company, $8,713.29; International Hydro-Electric Corporation and Warren Curtis Manufacturing Company, $546.80. Tax levies for the cost of operations of the reservoir in Warren County

are as follows: Finch, Pruyn & Co., Glens Falls, $3,930; Moreau Manufacturing Company, Queensbury, $150; International Hydro-Electric Corporation and International Paper Company, $10,470. Town of Luzerne, International Hydro-Electric Corporation and International Paper Company, $237.50; New York Power and Light Company, $1,427.50; International Paper Company, $1,533.75; International Hydro-Electric Corporation and Warren Curtis Manufacturing Co., $96.25.

Masonite Earnings Up 44 Per Cent

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—Earnings as of June 5 for the Masonite Corporation, were 44 per cent higher than the previous year, according to reports issued to stockholders last week.

Operating on a 13-period fiscal year, the company showed net profit for the ten periods of 40 weeks ending June 5, before preferred dividend requirements, of $1,318,080.87. After deduction of preferred dividend requirements of $85,141.37, there was $1,232,939.50 available for dividends on 536,702 shares of common stock now outstanding.

Munising Paper Co. Files Statement

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—A statement has been placed on file with the Securities Exchange Commission covering issuance of $650,000 in first mortgage bonds by the Munising Paper Company, Munising, Mich. Proceeds of the sale of new five per cent bonds on a 10-year sinking fund basis are to be used to retire outstanding six per cent bonds totalling $524,000 due serially to October 1, 1943.

Tomahawk Kraft Nets $168,735

APPLETON, Wis., July 6, 1937—During the fiscal year ending May 31, net earnings of the Tomahawk Kraft Paper Company, Tomahawk, Wis., were ten times greater than in the preceding twelve months, according to S. B. Bugge, vice-president and general manager. Net profits totalled $168,735, compared with $16,598 the preceding year. Earnings were equal to $4 a share of common stock against a previous 40 cents.

Rhinelander Splits Stock

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 6, 1937—Stock of the Rhinelander Paper Company, Rhinelander, Wis., has been split five for one, according to announcement made by Folke Becker, president. The split was ordered to place the firm in a more favorable position for issuance of additional stock. The company's 30,000 shares of $100 par value were split into 150,000 shares at $10 par.

Engineering Tables

The Stebbins Engineering and Manufacturing Company, Watertown, N. Y., has issued a bulletin of useful engineering tables which will be sent gratis to interested persons. The bulletin gives capacity of tanks, tables of circles, tables of sphere and decimals of a foot.

Geo. W. Millar & Co. Hold Outing

The annual outing of the officers and employees of Geo. W. Millar & Co., Inc., 284 Lafayette street, New York, N. Y., was held on Saturday, June 28 at Karatsonyi's Hotel, Glenwood, L. I. A large streamline bus took the party from the office to the grounds, and on arrival at 11:30 A. M. a sumptuous breakfast was served, after which the party repaired to the baseball field to begin the festivities.

Four full teams of nine men each had been formed. The first game was played between the "Paper Peddlers" and the "Chair Warmers". The former appeared on the field with long handlebar whiskers, and the "Chair Warmers" not to be outdone, appeared in white uniforms with large green Kodapak neckties. Judge J. J. Dillon, as usual, was the umpire, and everybody questioned his decisions. The "Chair Warmers" won by 6 to 5.

The second baseball game was then put on between the "Hand Shakers" and the "Order Takers". This game was replete with surprises. Dutch Krudop played for both teams and while reclining at second base made a double play unassisted. Dan Browning went to bat on the slightest provocation and notwithstanding all these handicaps, the "Hand Shakers" won the game by 7 to 5.

The athletic events were then in line and resulted as follows:

Ball Throwing Contest—1st Carl Nygren; 2nd, L. C. Greenman, 3rd, H. Hashagen.

Pitching Horse Shoes—1st, Arlie King, 2nd, James Norton; 3rd, Jack Smith.

Rewinding Roll Contest—1st, Oliver Hamre; 2nd, Charles Herrmann; 3rd, Ed Wall.

Relay Race—Team composed of Andy Anderson, Bob Persell, Bill Jennings, Jr., won by one yard over second team. 7 teams of three competed.

60-Yard Dash (Scratch)—1st, Henry Krudof; 2nd, Joe Barbieri; 3rd, John Murphy.

Shoe Race—1st, E. A. Dillon; 2nd, Sam DeHoff; 3rd, Dick Schott.

Five door prizes donated by J. C. Mallalieu were won by C. K. Lloyd, Carl Schorske, J. T. Anderson, Leo Reed, Carl Nygren.

During the ball game several kegs of beer provided by Jim Levens and John J. Dillon appeared and were placed at convenient places on the diamond.

The committee in charge was: Larry McMahon, chairman; Harry Werner, Charles Strang, Carl Schorske. M. L. Seiler.

Cost Finding Committee Meets in Boston

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., July 6, 1937—A luncheon meeting of the cost finding committee was recently held at the Boston Chamber of Commerce, which was attended by F. Bendel Tracy and Chester A. Spaulding, president and assistant secretary, respectively, of the National Paper Trade Association of the United States. Chairman Harry J. Dowd presided.

At the next meeting of the committee, scheduled for July 16, particular attention will be given to distribution problems of gummed tape.

The wrapping paper merchants have decided that Saturday closing during the summer months would be optional with each merchant.

Expansion of the Paper Industry in South And Its Effects Elsewhere*

By Dr. Carl B. Fritsche[1]

While production of pulp in the Southern States has had a very important effect on the pulp and newsprint situation of Canadian and Scandinavian countries, the outlook is by no means as gloomy as indicated at first glance. The present investment in Southern pulp and paper mills, including those in operation and now under construction, represents $137,000,000. New mills at present in course of erection include thirteen kraft mills, one book and bond paper, and one newsprint plant. Two hundred million acres of the twelve Southern states are covered with pine, most of which are comprised of the varieties known as slash pine and loblolly short leaf pine. This species reseeds itself and since the rainfall averages better than fifty inches per annum and the growing season averages ten months, a pine seedling reaches cord wood size in ten years as compared to forty to sixty years in the more Northern latitudes.

What Resin Really Is

When Dr. Herty first advanced the proposal that the manufacture of bleached newsprint should be commenced, paper chemists throughout the world scoffed and asked the pertinent question, "How will you get rid of the resin in Southern pine?" However, Dr. Herty carried on investigations which revealed that the presence of resin was indicative of one or two things, either that the tree had suffered injuries in its youth, or else that it was afflicted with hardening of the arteries of old age. According to Dr. Herty, resin is nothing more than the pathological remedy prescribed by nature to cure these two afflictions. His logical conclusion, therefore, was, if you protect the tree when it is young and cut it when it is not too old, the presence of resin will be negligible.

Making Newsprint on Commercial Scale

Having proved to his own satisfaction that newsprint could be produced on a laboratory scale from Southern pine, Dr. Herty concluded that a full scale factory test run was the next step. In the fall of 1933, through the courtesy and co-operation of the Beaver Wood Fiber Company Limited, of Thorold, Canada, arrangements for such a test were made. Twenty-five tons of chemical and mechanical pulp produced in the Savannah laboratory were shipped to the Thorold plant and on November 1 of that year the thrilling test was made.

For nine and one-half hours the paper machine hummed away producing one roll after another without a break in the paper, using the sulphite process. The success of this run was hailed as a remarkable achievement and fully confirmed Dr. Herty's predictions. In commenting on the test, John Ball, Manager of the Beaver Wood Fiber Company, stated that "there was no pitch at any time and in fact the paper which we ran stuck to our first press roll 75 per cent less than it did on our regular spruce pulp."

The newsprint produced in this test was used by leading Southern dailies for printing a full edition and excited great interest.

However, Dr. Herty was not satisfied and his experiments were continued seeking the entire elimination of the fats and fatty acids from the pulp, which he has now accomplished. Hence it can be stated with positive certainty that newsprint can be manufactured from Southern short leaf pine having as good tensile strength, bleaching and blotting properties as that made from Canadian or Scandinavian spruce.

South's First Newsprint Firm

The South's first newsprint paper manufacturing company has now been organized and financed by Texas capital and will be located in the pine belt in the Eastern part of the state. It will have a capacity of 40,000 tons annually which has been contracted for by Texas newspapers. According to one of the leading paper engineers in the world, who has built some forty paper plants during his career, the factory cost, including manufacturing, depreciations, overhead and taxes, will be under $30 per ton. To this figure, of course, must be added profit and delivery cost.

It is predicted that within the next decade the number of new pulp, kraft and newsprint mills in the South will increase to no less than one hundred.

Effect in Scandinavia and Canada

The question naturally arises, what is going to be the effect on the pulp and newsprint mills of the Scandinavian countries and of Canada? The outlook is not as gloomy as one might think at first glance.

In the first place forestry surveys recently made in the Scandinavian countries indicate that in spite of a most methodical reforestation program those countries have reached their maximum in output of cord wood for pulping. In addition the use of newsprint and of pulp for synthetic yarns has expanded tremendously in all European countries since the World War. One prominent European exporter predicts that within a few years all of the output of the Scandinavian countries will be needed and will be utilized in Europe.

The rapid consumption of spruce in the Canadian forests and the absence of adequate reforestation programs recently inspired one large London newspaper publisher to predict that the world faces the prospect within a reasonable time of a newsprint shortage.

Southern Development Will Not Affect Canada

This assertion coupled with the fact that other countries outside of Europe are constantly increasing

* Extract from address at annual convention of Canadian Chemical Association and Canadian Institute of Chemistry, Vancouver, B. C.

[1] Managing director, National Farm Chemurgic Council, Dearborn, Mich.

their demand for newsprint and for pulp used in making synthetic yarns leads to the conclusion that while the Southern newsprint development may at times cause uncertainty and perhaps inconvenience to Canadian producers, nevertheless in the long run the Southern development will do them no harm. Their principal task will be to develop new markets in other areas to replace the market which for so long they have dominated in the States.

In fact the scientific world is just beginning to find out what cellulose, which is the woody fiber freed of lignin, consists of and what it can be used for. The research work in this field being conducted by the Chemical Foundation and the Council in co-operation with the Boyce Thompson Institute and the Massachusetts Institute of Technology, indicates the possibility of an amazing variety of new uses for cellulose in volume greater than for paper making and as a substitute for inorganic minerals which now constitute the bulk of our manufactured commodities.

Research by Champagne Paper Co.

Research work which has been carried out by the Champagne Paper Company has revealed that hemp fiber can be used in the production of the highest grade of alpha-cellulose, and in this form it is eminently satisfactory for the manufacture of cigarette paper. This one development at Mankato on which only $30,000 has been spent on research forecasts in the near future the establishment of a new 20 million dollar cigarette paper industry in the United States.

The use of flax fiber for the same purpose is now being investigated with promising results.

Instrument Control In Pulp Cooking*

By Malcolm B. Hall[1]

I am very definitely not coming before you today as an expert in pulp cooking, although I have been exposed to its atmosphere for several years, but rather as one with twenty-odd years' experience in the instrument industry, which presumably qualifies me as an expert in that field. I am not going to talk to you about instruments as such, but preferably about what instruments can do and are doing to help produce better pulp.

In any process in which raw materials are converted into a finished product there are a number of variables which can affect the final result. It is obvious therefore that if these variables can be controlled, the finished product must me uniform.

We approach a problem of this kind by first analyzing the variables and then attempting to establish the relative importance of each to the whole. This requires a careful study of the complete process and obviously we acquire an intimate knowledge of the equipment used and the methods of operation. We gather our information from observation and from those responsible for the process operation and may I say right here that I do not know of any industry in which there seems to be such a variety of opinions on how to produce results as in pulp cooking.

It is not our object to attempt to establish a uniform method of operation for the entire industry, but to offer means by which better results may be obtained with existing equipment, if at all possible. This may lead to the conclusion that present equipment is inadequate or operating conditions cannot be changed which leaves us right behind the eight ball. But seldom do we find a situation where instruments, correctly applied, do not help to produce better results.

Apparently most of the problems in pulp cooking have been in the acid cooking process because this branch of the industry has been most active in its requirements for instrumentation but recent developments in the refinement of sulphate pulp indicate a demand for closer control of the entire process and we may expect to see considerable activity in instrumentation in the near future.

To give you a picture of the complete instrumentation problem in sulphite pulp cooking, I shall attempt to point out the variables in each step of the process.

In the Acid Plant

Let us start with the acid plant. I will not discuss the respective merits of the various acid making systems; objectively, they are the same. The raw material is sulphur, water and air. It doesn't appear as if there were any variables in these items but actually there are, either in the items themselves or the manner in which they are introduced into the process.

Let us assume that the composition sulphur is uniform; however, it must flow to the burner at a uniform rate. The viscosity curve of sulphur in the molten state is very odd but it does have a reasonably flat spot within certain temperature limits, consequently if its temperature can be controlled within these limits there will be no viscosity changes to change the rate of flow.

If a hand valve is used in the sulphur line to set the rate of flow, the pressure ahead of this valve must be uniform, otherwise the drop across the valve will change, which means a change in flow rate.

Efficient combustion depends upon a uniform rate of flow of sulphur and a constant weight of air per unit of time. Air is a variable, "believe it or not." The actual weight of the air per unit of time must be uniform if efficient combustion is to be maintained. Air weight varies with temperature and barometric pressure and unless it is under automatic control, the combustion results may vary widely. Combustion temperature control is not important nor is it necessary if the sulphur flow is uniform and the air weight per unit of time is constant.

The rate of absorption of SO_2 is a function of the gas temperature and the rate of flow of water and "believe it or not" water is a variable. Presumably the temperature of the water is a function of the rate of absorption of gas, but the temperature change in continuously flowing cold water is negligible. If the rate of flow of water varies, however, the amount of gas absorbed will vary and consequently, the raw

*Presented at the annual convention of the American Pulp and Paper Mill Superintendents' Association, Springfield, Mass., June 23-25, 1937.

[1]Manager Pulp and Paper Division, the Foxboro Company, Foxboro, Mass.

acid strength will vary. So much for the acid system up to the point of cooking.

The two major variables in acid cooking are acid concentration and temperature and chip conditions. Let us assume first that we can produce an acid of uniform concentration and temperature; what can we do about the chips? Their moisture and density vary. These variations may be seasonable and we can make allowances for them in our cooking schedule, or we can precondition the chips to bring them as nearly as possible to a uniform condition before we start to cook.

These are conditions about which I am in no position to enter into any discussion, but I do know that if they are intelligently handled, cooking can be greatly improved by suitable control of steam flow, top relief, and digester level.

Four Major Methods of Cooking

At present there are four major methods of sulphite pulp cooking: direct steaming, without acid control; direct steaming with acid control; direct steaming with recirculation and indirect steaming with recirculation and heat exchangers. Take your choice! But whatever your choice may be, instrument control will help you.

In all four methods, automatic control of top relief is important. If top relief is not smooth and constant, acid recovery is inefficient and except where heat exchangers are used, steam flow is upset which in turn very materially upsets cooking results. A very definite example of this occurred in a Pacific Northwest mill. No. 1 digester was equipped with top relief and undercooked chips immediately disappeared. The control equipment was changed from No. 1 to No. 2 digester and immediately undercooked chips disappeared in No. 2 and appeared again in No. 1. The reason is perfectly obvious; if the pressure is relieved in such a way that a pressure drop of even one pound occurs, the rate of flow of steam is simultaneously changed by the difference in pressure drop across the steam valve, and this change upsets convection currents which in turn upset the cooking conditions.

If the acid conditions are under control, the digester is uniformly charged, the chips are preconditioned, very definite cooking schedules can be set up and followed with assurance of consistent results. One of the outstanding examples of complete automatic control under these conditions may be found at the Soundview Pulp Company, Everett, Wash. This company has twelve digesters completely equipped with top relief control steam flow control and digester level recorders.

The Pulp Division of The Weyerhaeuser Timber Company at their Longview and Everett Mills have thirteen digesters. All are equipped with automatic top relief control. The Everett Mill has digester level recorders and steam flow meters and the Longview Mill has steam flow controllers.

In addition to these installations there is automatic cooking control at Olympic Forest Products Company, Rainier Pulp & Paper Company, Grays Harbor Pulp and Paper Company, Shaffer Pulp Company, and Crown Willamette Paper Company.

Relief Pressure and Steam Flow

I have mentioned acid and chips condition as two of the variables in cooking, but there are two other very important ones, namely, relief pressure and steam flow. I have explained that relief pressure variation can upset cooking by upsetting the steam flow but I haven't explained how the steam flow can be upset although the relief may be under automatic control.

In applying steam to pulp cooking, we are primarily interested in B.t.u. input. We know that cooking requires so many pounds of steam per ton of pulp, but instead of thinking in terms of pounds of steam, which after all doesn't mean any more than pounds of prunes or potatoes, why not think in terms of B.t.u.'s which is a measure of heat input and heat is what actually cooks pulp.

In cooking systems in which the acid and chip conditions are under reasonable control, it is possible to establish predetermined cooking schedules. This means that the B.t.u. input can be controlled and whether it is steam flow control or temperature control depends upon the system. Either is B.t.u. flow control.

If steam flow is controlled by a hand valve, any variation in pressure either ahead or after the valve will effect a change in rate of flow which will be reflected in cooking results. If, on the other hand, the steam flow is controlled automatically either by a Flow Controller or a Temperature Controller, they automatically compensate for any pressure variations and produce a uniform B.t.u. input.

The choice of steam flow control or temperature control is governed entirely by the type of cooking system. Obviously, a Temperature Controller can control the temperature only in the immediate zone of the sensitive bulb, and in a natural circulation digester this zone may have no relation whatever to temperatures through the digester. Furthermore, the time lag between a change in rate of steam flow and the effect of this change at the sensitive bulb may be so great that altogether too much heat may be added to other parts of the cook and at the same time circulation may be disturbed.

Temperature control is applicable only to those systems using heat exchangers. The sensitive bulb is placed in the outlet liquor line from the heat exchanger with the automatic valve in the steam line to the heat exchanger. With this arrangement all of the liquor entering the digester can be controlled at any required temperature or on a predetermined temperature curve through a time schedule.

Steam flow control is applied to direct steaming and recirculating systems without heat exchangers. If acid and chip conditions are uniform, a predetermined steam flow schedule can be established and cooking can proceed on a time flow basis.

Where acid conditions are poor in a direct steaming digester, a steam flow controller will help materially because it can be set manually for any desired rate of flow and it will hold that rate in spite of any upsetting conditions such as steam pressure variation, and circulation has been very definitely improved by the installation of such control.

Liquid Level Recorders

Liquid level recorders for showing the acid level in digester using the Chemipulp system are extremely important. They not only make a continuous record of acid pumping and side relief draw down for each cook but they enable the operator to handle the side relief and regulate the level to obtain the most efficient acid recovery.

FROM ONE SUPER-CALENDER USER TO ANOTHER—

"Here is why we are ordering more VICKERY DOCTORS.

"They save us roughly fifty per cent of the man-hours we used to need for sanding rolls. We had two men on one side of the stack wiping off sand while one man was sanding. Now, with the Vickery Doctors it's a one-man job. What's more, we cut down the amount of sanding because the sheet no longer wraps around the rolls when we have a break on the stack.

"We've noticed another advantage when we're running narrow sheets. This always means a certain amount of fuzz collecting on the edge of the sheet and, before we had the doctors, it was quite likely to mark the rolls.

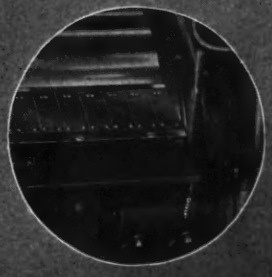
"Another thing that used to cause us a lot of trouble was oil from the bearings getting on the edges of the rolls. This doesn't happen any more.

"We also notice that we don't have any more scabs and dirt sticking to the rolls and causing breaks and rejects and that we can run faster now that we have the Vickery Doctors."

(Excerpt from a letter received from a maker of high grade rag papers)

BIRD MACHINE COMPANY • SOUTH WALPOLE • MASS.

Vickery Doctors



YOU CAN MAKE MORE MONEY WITH NEW BIRD MACHINERY

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 7, 1937—The Government Printing Office has received the following bids for 150,000 pounds of M. F. book paper: John F. Post, Inc., 6.14 cents per pound; Fitchburg Paper Company, 6.39 cents; Perkins-Goodwin Company, 6.14 cents; Whitaker Paper Company, 6.14 cents; R. P. Andrews Paper Company, 6.14 cents; Stanford Paper Company, 6.39 cents; Barton, Duer & Koch Paper Company, 6.14 cents; Walker, Goulard, Plehn Company, 6.39 cents; and Marquette Paper Company, 6.125 cents.

For 34,500 pounds (300,000 sheets) of blue sulphite writing paper: Virginia Paper Company, 7.17 cents; Stanford Paper Company, 7.92 cents; Cauthorne Paper Company, 7.17 cents; John F. Post, Inc., 7.42 cents; Barton, Duer & Koch Paper Company, 7.17 cents; and R. P. Andrews Paper Company, 7.16 cents.

For 34,650 pounds (150,000 sheets) of 38 x 48 and 44 x 64, 75 per cent rag, lithograph finish map paper: Reese & Reese, Inc., 13.61 cents; R. P. Andrews Paper Company, 18.73 cents; Barton, Duer & Koch Paper Company, 14.77 cents; Mudge Paper Company, 17.15 cents; Stanford Paper Company, 17.5 cents; Old Dominion Paper Company, 24.98 cents.

For 250,000 pounds of newsprint paper: National Pulp and Paper Company, 2.5 cents per pound; Paper Corp. of U. S., 3.42 cents; and Stanford Paper Company, 2.7 cent (for 120,000 pounds only).

The Virginia Paper Company has been awarded the contract for furnishing the Printing Office with 70,000 pounds (100,000 sheets) of 21½ x 32½ chip board at 2.029 cents and the R. P. Andrews Paper Company will furnish 39,900 pounds (450,000 sheets) of 24 x 38 and 28 x 34 yellow sulphite writing paper at 7.17 cents. Bids for these items were received on June 21.

The R. P. Andrews Paper Company will furnish 350,000 pounds of supercalendered book paper in 38" rolls at 5.74 cents and the Whitaker Paper Company will furnish 200,000 pounds of M. F. book paper in 32 inch rolls at 6.11 cents. Bids for these items were received on June 18.

For 10,000 sheets of 24 x 36 white cloth lined paper: Whitaker Paper Company, $113.18 per M sheets; Reese & Reese, Inc., $112.70; Mathers-Lamm Paper Company, $112.00; Barton, Duer & Koch Paper Company, $113.80; Virginia Paper Company, $112.50 less 2 per cent; Walker, Goulard, Plehn Company, $116.65; Charles W. Beers & Company, $114.60; and R. P. Andrews Paper Company, $117.00.

The Paper Corporation of the U. S. will furnish 400,000 pounds of newsprint paper at 3.375 cents per pound, bids for which were received on June 7.

For 28,000 pounds (100,000 sheets) of tag board: Whitaker Paper Company, 8.49 cents; Reese & Reese, Inc., 8.25 cents; J. R. Howarth Paper Company, 9.95 cents less 2 per cent; and Enterprise Paper Company, 7.487 cents less 1 per cent.

Prize Winners at Westmoreland Outing

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., July 6, 1937 — While making preparations for the third of the series of monthly golf outings held by the midwest division of the Salesmens Association of the Paper Industry, Ralph Burnett, chairman of the outings, finds time to list the prize winners at the Westmoreland outing held on June 18. The attendance record of 84 salesmen and guests will be hard to beat when the association gets together at Bob-O-Link Golf Club on Friday, July 23. Prize winners for the Westmoreland outing are as follows: low gross, H. F. Leahy, LaSalle Paper Company; blind bogey, H. Berge, Appleton Coated Paper Company; low net, 17 and under, R. E. Whitelaw, Butler Paper Corporation; low net, 18 and over, R. C. Swan, Champion Paper and Fibre Company; second low net, 18 and over, Ralph Laue, Bradner Smith & Co.; third low net, 18 and over, W. L. Snelling, Associated Stationers Supply Company; low net, first nine, W. A. Sipp, Economy Blue Print Products Company; low net, second nine, L. C. Field, Dwight Brothers Paper Company; low putts, first nine, E. V. Zahringer, Messinger Paper Company; low putts, second nine, Harold Knott, Eastern Manufacturing Company. The high gross foursome was composed of A. H. Cochran, Mead Sales; George Clark, Bradner Smith & Co.; J. T. Daly, Wrenn Paper Company; J. W. McAllister, James White Paper Company. The low net foursome was made up of R. C. Swan, D. Fortney, G. Frehlinger and R. E. Whitelaw, the latter three all from the Butler Paper Corporation. The low putt foursome winners were A. G. Shennon, International Tag & Salesbook Company; W. B. Moore, Brown Company; B. B. Fisher, Bergstrom Paper Company and I. H. Peck, International Paper Company.

To Finish Building in August

[FROM OUR REGULAR CORRESPONDENT]

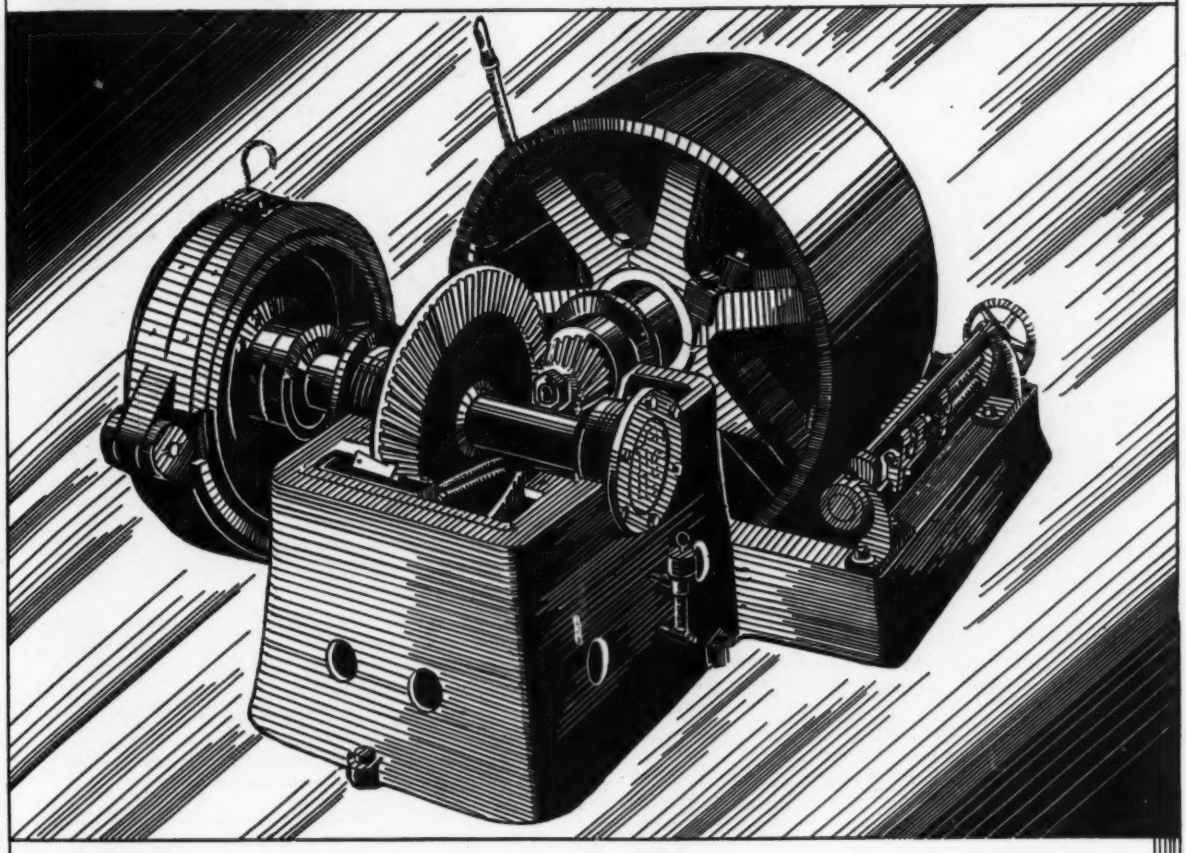
APPLETON, Wis., July 6, 1937—Work will be completed the latter part of August on the building program started early in April by the Marathon Paper Mills Company at its carton division at Menasha, Wis. A crew of 89 men is working under the direction of the James Lack Construction Company, Minneapolis, Minn., to complete the improvements.

The principal new unit is a wax division building 255 by 61 feet, containing a basement and two floors. It is of flat slab construction on the first and second floors, with beam construction on the roof. The basement will be used for storage, the printing and wax conversion departments will be on the first floor, and the finishing department on the second floor. One of the old warehouses was moved 61 feet to the west of its present location to make room for the new building.

The other unit is a new tank building of smaller size in which 16 tanks for wax storage will be placed. Part of these were moved from the former storage building. Its location will permit tank cars to reach the building directly, instead of being routed through the storage structure.

In order to eliminate truck traffic congestion, the company will erect a bridge 13 feet in width and 10 feet high, having a street clearance of 19 feet to connect the wax and carton divisions. Electrically driven trucks will convey materials from one building to the other. Traffic congestion also will be relieved by a new loading platform being built on the west side of the warehouse, away from the street. Additional sidetracks also are being installed to permit the spotting of more freight cars.

SWEET MUSIC TO MILLWRIGHTS



The smooth, low hum of Black-Clawson drives in operation is sweet music to the ears of every millwright. These men know that such hum is the result of precision manufacturing, dynamic balance, and rugged strength. These are the reasons the "word got around" when the B-C drive was placed on the market.. reasons why one mill ordered 65 and scores of others bought from 2 to a dozen ● You, too, will be impressed when you get the complete details. The Black-Clawson Co., Hamilton, O. Owners of Shartle Brothers.

BLACK-CLAWSON

J. F. Keville Opens Office

J. F. Keville has opened an office at 2134 Waite avenue, Kalamazoo, Mich. and will represent a few well known manufacturers of paper and paper products. He will cover the southern Michigan peninsula, Ohio and Indiana, including Detroit, and also Chicago on some of the lines. The lines handled will all be non-competitive and manufactured by mills in position to serve this market efficiently. Mr. Keville has had a broad experience in the manufacture, conversion and distribution of papers and paper products of various kinds. Although still a young man, his work in the industry covers a period of twenty years of which fifteen years have been in executive capacities in management and sales. He has contributed many practical and profitable ideas in paper lines and packaging, and is well and favorably known among mills, distributors and converters throughout the country. His customers can be assured of his usual close cooperation and interest in their problems, which have made him many friends in the paper trade.

Walker, Goulard, Plehn Co. Have Outing

Favored with perfect weather, the largest crowd that ever attended a similar affair, enjoyed themselves to the fullest extent at the fifth annual outing of the Walker, Goulard, Plehn Company, at Narragansett Inn, Lindenhurst, L. I., on June 26, 1937.

Starting at 11:30 A. M. the Games Committee took charge and held the interest of the crowd until the last dance at 9 P. M.

After dinner, the assemblage was addressed by officers of the company, who thanked their employees for the splendid record made by the company during the first ten years of its existence.

A group picture was taken, and the afternoon was featured by a soft ball game between the visitors and members of the W.G.P. organization. After spotting the visitors nine runs in the first two innings, W.G.P. came back in a perfect orgy of base hits to eke out a victory 11 to 10.

Door prizes were won by R. Finley and S. Meyer. Mrs. Everett Goulard won the women's potato race, and her husband, Everett Goulard, not to be outdone, took first place in a similar event for men. Miss Agnes Burghardt was a double winner, coming in first in the rolling pin throwing contest and the women's walking race. Vincent Burns won the horseshoe pitching contest, and Gerard Burke won the basket pitch. Master A. Ferrer won the prize in the children's group. There were too many beer drinking champs to list.

Paper Men to Meet at Worcester

WORCESTER, Mass., July 6, 1937—The Eastern States Paper and Bag Distributors Association is to hold a local organization meeting July 8 at the Hotel Bancroft in this city. Walter G. Butler, of Perkins & Butler, Worcester, is arranging for the meeting and inviting the wrapping paper merchants of Worcester County.

Glenn E. Townsend Dead

KALAMAZOO, Mich., June 27, 1937—Glenn E. Townsend, for more than 30 years connected with the paper industry in this city, died Sunday morning, at Borgess Hospital, after an illness of one week. He had been in failing health for two years, but was able to carry on as head of the order department of the Rex Paper Company until about a month ago.

Mr. Townsend was among the pioneers in the coated paper industry in this valley. He was first connected with the old Riverview Coated Paper Company, and in 1912 went with A. L. Pratt and John F. King of the King Paper Company where he was in direct charge of the Coating Division, a new venture at that time for the King Paper Company. There he remained until 14 years ago when he entered the employ of the Rex Paper Company. He was considered one of the outstanding coated paper production men in the country and had a wide acquaintance in the paper industry.

He was born on a farm near Augusta, Mich., July 12, 1878, son of Mr. and Mrs. Eugene Townsend and aside from a number of years spent in Detroit, had lived in Kalamazoo all his life. He is survived by a daughter, Miss Virginia Townsend of this city.

Services were held at Truesdale chapel, Tuesday afternoon. Honorary bearers were Samuel Han Hout, Allied Paper Mills; Louis P. Simon, Bermingham & Prosser Company; Harry Rowley, Chicago Paper Company; N. A. Altmann, Butler Paper Corporation; M. R. Musselman, Kalamazoo Vegetable Parchment Company; Dr. R. L. Workman, Arthur Gervais, Chope Stevens Paper Company; and Edward Noble, Arthur Cole, Henry Nendorf, Roy V. Mc Culfor and Harry C. Bradford of the Rex Company. Active bearers were Noe Themins, Roy Noble, Larkin Noble, Elmer Des Voignes, Robert Dietiker and Harold Heath. Burial was in Riverside cemetery.

Stonite Patent Upheld in Germany

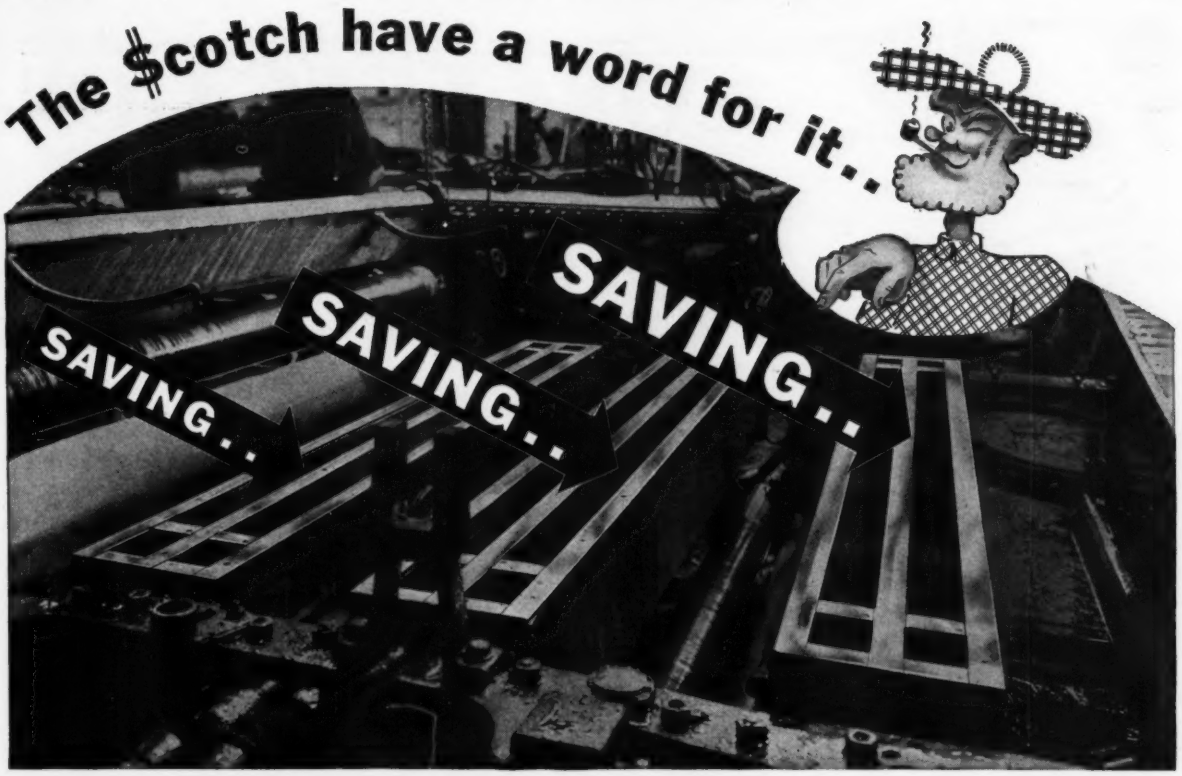
The validity of the American and foreign patents on the widely known "Stonite" press rolls for paper making machines has recently been upheld by a far reaching decision rendered in the courts of Germany, according to recent dispatches from Germany.

One of the basic points upon which the decision was reached, it is stated, was that the protective range of the "Stonite" patent made it immaterial, as a matter of law, whether the infringers used pulverized natural stone or an artificial stone, for in the use of this equivalent material for the manufacturer of rolls for the identical purpose of application lay the patent infringement.

In view of the large number of "Stonite" rolls now in service throughout the world, this decision is of considerable interest.

H. B. Allen Goes With Astell & Co.

H. B. Allen, who for fourteen years was New York District sales manager of the Babcock & Wilcox Tube Company, has resigned from that company to become Vice-President of John B. Astell & Co., Inc., 90 West Broadway, New York, distributor in the New York Metropolitan district of B&W Seamless Carbon Steel Boiler Tubes and Alley Tubes, and a wide variety of other tubular products including all kinds of welding fittings.



• *Monel suction box cover used at a prominent Ontario, Canada mill. The cover is ⅛" thick, 8" wide and 8 ft. 4¼ in. overall. It operates on fourdrinier machine producing high grade papers, such as book cover and writing paper.*

• *This machine used in the making of bag paper in a Scottish mill has wooden suction boxes with Monel strip fastened to their tops. The Monel strip has rounded edges and is ¼" thick and 1¾" wide. For years in service, it has been found that the wear on the Monel covers is negligible and that Monel maintains a glass-smooth surface.*

• *Monel Suction Box, one of several recently manufactured by Rice, Barton & Fales, Worcester, Mass. Constructed of Monel these boxes combine the latest in mechanical design with non-rustable, high strength, corrosion resistant material having a durable smooth surface which allows free and thorough removal of white water and facilitates cleaning. Monel Suction boxes are in use in a number of paper plants in this country.*

THE Scotch respect a nickel in the purse, and the Nickel in Monel* — especially when it comes to suction box tops.

For Scottish paper makers — English and Canadian too — have used Monel for years on fourdrinier machines producing writing, book-cover, bag and a wide variety of other papers. And according to them, "Monel strip has proved the best material yet found for suction box tops."

If you'd like to know why *you* can benefit from these applications, here are the reasons:

1. The tough surface of Monel resists abrasion by the fourdrinier wire—and its corrosion resistant qualities resist the action of white water. It acquires in service a polished glass-smooth surface—no grooves. As a consequence, both cover and fourdrinier wire wear better, last longer. All of which results in better quality of paper.

2. Combined with its high strength, Monel has a modulus of elasticity twice that of brass, thereby resisting deflection under 7 to 10 inches of vacuum — an important factor on wide machines.

So count your costs on suction box cover replacement, fourdrinier wire failure, blemishes in paper: then try Monel — *and learn what Scotch paper makers mean by* "SAVING".

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

MONEL

* Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled, and marketed solely by International Nickel.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Pulp and Paper Mills

Construction News

Ilchester, Md.—The Bartgis Brothers Company, manufacturer of box board products, is continuing expansion in new structures at mill, and has asked bids on general contract for new two-story addition, to be used in part for storage and distribution. It is reported to cost over $30,000, with equipment. Erection contract is scheduled to be awarded early in July, when work will be placed under way. Frederick L. Smith, 21 East 40th street, New York, N. Y., is architect. As recently noted in these columns, company has approved plans for new one-story mill addition, 80 x 110 feet, to be used for expansion in production and has let general contract to Julius A. Kinlein, American Building, Baltimore, Md.; work is being placed under way. Last noted structure is estimated to cost over $50,000, including equipment.

Chicago, Ill.—The Outlook Envelope Company has been organized with capital of 500 shares of stock, no par value, to manufacture and deal in commercial envelopes and kindred paper products. New company will take over and succeed to the organization of same name, with plant and headquarters at 1001 West Washington street. Incorporators include B. McDougall and W. H. Mazant.

Los Angeles, Cal.—The Johns-Manville Corporation, 22 East 40th street, New York, N. Y., manufacturer of insulating building board, asbestos board and kindred products, has engaged the Stone & Webster Engineering Corporation, 49 Federal street, Boston, Mass., engineers, to prepare plans and supervise erection of proposed new mill at Los Angeles, recently referred to in these columns, where company has acquired a tract of about 50 acres of land at Alameda avenue and 283rd street. It will consist of several units and is estimated to cost close to $1,000,000, including equipment. Erection is scheduled to begin at early date.

Jacksonville, Fla.—The National Container Corporation, Review and Borden avenues, Long Island City, New York, N. Y., manufacturer of corrugated boxes and containers, has broken ground for proposed new kraft pulp and paper mill at Jacksonville, where tract of land was acquired a few months ago, and will proceed with superstructure for main units. Property was formerly used by the American Agricultural Chemical Company and certain buildings of that plant will be remodeled and modernized for the new mill, which is scheduled for completion early next year. Equipment contracts are being let. Plant will be equipped for an initial capacity of 200 tons of kraft paper per day and will cost about $3,200,000. Merritt-Chapman & Scott Corporation, 17 Battery place, New York, has the general erection contract. Johnson & Wierk, Inc., New York, are consulting engineers.

Enka, N. C.—The American Enka Corporation, Enka, near Asheville, N. C., manufacturer of cellulose rayon products, has awarded general contract to Potter & Shackleford, Greenville, S. C., for new one-story addition to mill, to be used primarily for storage and distributing service. It is estimated to cost close to $60,000, including equipment. Company has work nearing completion on extensive expansion program at plant, in progress for a number of months past, providing about 100,000 square feet of additional floor area. Considerable additional equipment will be installed, entire project to represent an investment of about $1,000,000.

Appleton, Wis.—The Tomahawk Pulp Company, Inc., has been organized by K. S. Dickinson, head of the Little Rapids Pulp Company, Little Rapids, Wis., and associates, to operate a pulp mill in this vincinity. F. P. Dickinson is interested in the new organization.

Emeryville, Cal.—The Paraffine Companies, Inc., 475 Brannan street, San Francisco, Cal., manufacturer of building and roofing papers, and kindred products, has superstructure under way for new additions to mill, comprising a four-story and basement structure, 95 x 97 feet, and one-story adjoining building, 60 x 115 feet, located on site at foot of Powell street, Emeryville. It is proposed to have units ready for equipment installation in near future. Structures will cost over $125,000, with machinery. The Clinton Construction Company, 925 Folsom street, San Francisco, has general contract for erection. Leland S. Rosener, 233 Sansome street, San Francisco, is architect and engineer.

New York, N. Y.—Eastern Box Specialties, Inc., recently organized with capital of 10 shares of stock, no par value, plans operation of local plant for the manufacture of paper boxes and containers. New company is represented by David J. Goldberg, 1450 Broadway, New York, attorney.

Painesville, Ohio—The Industrial Rayon Corporation, West 98th street and Walford avenue, Cleveland, Ohio, manufacturers of cellulose rayon products, has awarded general contract to the Hunkin-Conkey Construction Company, 1740 East Twelfth street, Cleveland, for proposed new mill in Painesville Township, near Painesville, recently referred to in these columns. Plant will comprise a large group of one and multi-story units, with main mill three and four-story, 80 x 320 feet. A power plant

will be built, as well as pumping station, office building, and miscellaneous structures. Entire project will represent an investment of about $7,500,000. Work on superstructure will be placed under way at once. Wilbur Watson & Associates, 4614 Prospect avenue, Cleveland, are architects and engineers.

Port Arthur, Ont.—The Provincial Paper, Ltd., 74 University avenue, Toronto, Ont., manufacturer of book and other paper stocks, is arranging early call for bids for additions and improvements in mill at Port Arthur, to include installation of considerable equipment. Entire project is estimated to cost close to $200,000. Company is affiliated with the Abitibi Power & Paper Company, Ltd., Iroquois Falls, Ont.

Toronto, Ont.—The Hinde & Dauch Paper Company of Canada, Ltd., 43 Hanna street, manufacturer of corrugated paper boxes and containers, is running on close to capacity schedule at local plant, and will continue on such basis for an indefinite period. The company has been making high production records during recent months, the first half of 1937 showing large increase in output over the corresponding period of a year ago. L. F. Winchell is vice-president and general manager.

London, England—Celotex, Ltd., London, affiliated with the Celotex Corporation, 919 North Michigan avenue, Chicago, Ill., manufacturer of insulating board, wall board and allied products, is having plans prepared by S. Warwick, 4 Cockspur street, S. W., London, architect, for proposed new mill in the Wembley district, London, previously noted in these columns, where large tract of land has been purchased. Bids will be asked on general erection contract at early date. Plant will consist of group of one and multi-story units, and will be equipped for a production of about 3,500,000 lineal feet of board products per month. Entire project is estimated to cost about $1,250,000, including machinery. B. G. Dahlberg, president of the Celotex Corporation, Chicago, is one of the heads of the English organization, which was formed last April.

Gippsland, Australia—The Australian Paper Manufacturers, Ltd., Melbourne, Victoria, Australia, is completing the construction of a new wood pulp mill at Morwell North, Gippsland, Victoria, for raw material supply for its three paper and paper board mills in different parts of Victoria. New plant comprises several large units and is expected to be ready for service at early date. It will represent a reported investment in excess of $500,000, including buildings and machinery. Company is also operating a paper mill in New South Wales.

Mukden, Manchuria—The South Manchuria Railway Company, Mukden, and the Oriental Development Company, Ltd., Tokyo, Japan, have plans under way for the organization of a new company to construct and operate a pulp mill in Manchuria, and in which the Government of Manchuria, Mukden, will have a large interest. The new company will be capitalized at 50,000,000 yen (about $14,400,000), with stock to be held jointly by the three interests noted. Proposed mill will be located in the vicinity of Mukden and will comprise a number of large one and multi-story units, equipped for an initial annual capacity of about 50,000 metric tons. Plant will specialize primarily in production of pulp for rayon manufacture, with majority of output to be used by rayon mills in Japan. Raw material supply will be secured from timber resources in the Khingan Mountain district, Manchuria. Initial mill is reported to cost over $4,000,000, with machinery.

Robertson Paper Box Co. Has Outing

On June 19, 1937, more than 350 children, women and men, in picnic array, met at Brown's Beach, on beautiful Gardner Lake, to play for the day at the Seventh Annual Outing of the Robertson Paper Box Company, Montville, Conn. It was exclusively a Robertson party, to which all employees brought their families for a good time.

The sports opened with a ball game between the Box Factory and the Board Mill teams to settle an old feud. At previous outings each team had won three games, so for this, the "rubber," to decide for another year "who's who" in Robertson baseball, Captain Harry Bell's Box Factory Tigers and Captain Ollie Messner's Board Mill Wildcats, came on the field in fine fettle, but with blood in their respective eyes. Well, at the end of the game, the series stood four to three in favor of the Box Factory, but Captain Ollie swears to even up in 1938.

Before the excitement had a chance to die down, ball teams—the Married vs. Single ladies of the company—took the field before cheering fans for what proved to be one of the most hotly contested scraps of the day, finally won, in extra innings, by Captain Katherine Belanger's "Singles."

Refereed by Archie Fisher, four boxing bouts followed and were won, respectively, by George Wood, Tarzan Turgeon, Walter Waliguerski and Whitey Kobelski. Theodore Allen took the Thread and Needle race for men, and Sophie Daniels for women. Miss Daniels also proved her supremacy in the candle race for women.

Time for luncheon, and was everybody ready for the feast of courses! Chatter, laughter, banter, and good fellowship. Then a resumption of the "Olympiad." An hour of games for children. A men's Baseball Throw, won by Lester McKinney. A Rolling Pin Throw for the ladies (a chance to "shine" with their favorite weapon), and Rita Allen proved herself best of all. A thought-provoking highlight, which rocked the fans with laughter: When Mrs. Ralph A. Powers, wife of the company's president, took her mighty heave, the Rolling Pin narrowly missed her husband, who stood on the side lines.

Came other rip-roaring games and dizzy races of startling and funny kinds. The married women won their Tug-O'-War, thus getting back at their single sisters for the baseball defeat. Captain Fred Hewitt's Box Factory Tug-O'-War team took the Board Mill's measure. Duane Rorick won the Balloon Blowing contest, Theodore Allen the Boat Race for men, and Victoria Rioux the one for women. In the Dancing Contest, Eddie Sullivan and his Missus out-stepped them all. After each event, a prize to the winner was awarded by Mrs. Elsa Rorick.

One of the outstanding features of this grand day of fun and frolic was the special acrobatic performance by Mr. Shafer of the New London YMCA and his little daughter, not yet three years old; but with poise, charm and acrobatic skill that might well be the envy of many professionals.

Those on the committee which planned the outing were Harry J. Bell, Ollie W. Messner, Mrs. Elsa Rorick and Harry W. Schwartz.

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COMING EVENTS IN THE PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY—Fall Convention, DeSoto Hotel, Savannah, Ga., Oct. 18-20, 1937.

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—Fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

EXPORTS AND IMPORTS OF PAPER SHOW SEASONAL DECLINE

Exports of paper and paper products from the United States during April show an aggregate value of $2,541,910 as against $2,797,047 during March, according to the Forest Products Division of the Department of Commerce. This decline is not unusual at this time of year and it is noteworthy that April exports surpassed those of the corresponding month last year by 37 percent. This increase, of course, is due in part to the higher average unit value of exports this year, but it is likewise due to an increase in the volume of a majority of the items. Among those in which exports more than doubled during April as compared with a year ago were: book papers 180 percent, old newspapers 103 percent, towels and napkins 128 percent, sheathing and building paper 145 percent, writing paper 116 percent, and cover paper 105 percent.

Heavy increases in the volume of shipments to foreign countries were also registered in greaseproof and waterproof papers 40 percent, surface-coated papers 22½ percent, toilet papers 22 percent, miscellaneous paper boards 48½ percent, wallboards 26 percent, paper hangings 51 percent, paper bags 72½ percent, envelopes 40 percent, and vulcanized fiber 61 percent. Exports of greaseproof and waterproof papers, old newspapers, surface-coated papers, towels and napkins, envelopes, and vulcanized fiber were also larger than during March, but the other items were unable to maintain their advance. Exports of newsprint paper were 17½ percent greater than in March but were still 45 percent under the amount recorded for April 1936. April exports of wrapping paper (other than greaseproof or kraft), tissue and crepe papers, box boards, fiber insulating boards, blotting paper, and cash register paper were lower than either March or April 1936.

Exports of paper base stocks during April dropped to $1,354,816 in aggregate value as against $1,532,842 in March, and $1,665,513 in April 1936. This decrease was due largely to a falling off in shipments of sulphite pulp. Exports of bleached sulphite dropped 19½ percent and exports of unbleached sulphite 18 percent under those of the preceding month. At the same time they were 31 percent and 55½ percent respectively under shipments made during the corresponding month last year. Exports of other classes of paper-making stocks show an average increase in value of 17 percent over March and were more than double those recorded for April 1936. Rag shipments were somewhat less than during March, but were well above the corresponding month last year. Exports of soda wood pulp and of old paper and other waste stock during April exceeded both March shipments and those made during the corresponding month in 1936.

Imports of paper and paper products into the United States during April declined slightly compared with March, while exceeding April 1936 receipts by 33 percent. April imports of standard newsprint, which make up the bulk of this trade, reached 263,620 short tons, a decline of 2½ percent under the preceding month but a rise of 30 percent over the corresponding month last year. Imports of other printing papers, greaseproof and waterproof papers, paperboards and pulpboards and cigarette papers were also smaller in April than the preceding month. Total imports in this group during April were valued at $10,991,085, of which $9,727,959 represented newsprint, and $1,263,126 other papers and boards.

Imports of paper base stocks into the United States during April underwent a decline of 17 percent in aggregate value but were 18 percent above those recorded for April 1936. With the exception of mechanical pulp and waste for paper making, all classes in this group failed to attain the level of the March receipts. Imports of bleached mechanical pulp, bleached and unbleached sulphate pulp and rags were also lower than during April 1936. Imports of unbleached sulphate, which is one of the leading items on this schedule, dropped off by 25½ percent. These losses were more than offset, however, by gains of 61 percent in bleached sulphite, 5 percent

in unbleached sulphite, and 49 percent in waste stock other than rags. Receipts of paper base stocks during April 1937 reached an aggregate value of $6,621,199 divided as follows: wood pulp $5,472,761, pulp wood $229,202, rags and other waste stock, $919,236.

China Clay Industry in 1936

WASHINGTON, D. C., July 7, 1937—Production of Kaolin in 1936 jumped to 638,939 short tons, valued at $4,537,738, compared with 523,656 tons valued at $3,765,268 in 1935, an increase over 1935 of 22 percent in tonnage and 21 percent in value. The 1936 output is an all-time record, 20 percent higher than the former peak of 1930. Curtailed imports since the period 1925-29 and increased consumption of domestic material in paper and rubber manufacture indicate rapid progress in technology, resulting in an expanded output of higher grade clays. The Bureau of Mines, in cooperation with the Tennessee Valley Authority and private clay companies, has developed methods for processing domestic clays to produce a carefully controlled uniform high-grade kaolin, equal to the best Czechoslovak porcelain clay. The T. V. A. has adapted electrically heated kilns to the manufacture of pottery, with gratifying results, and the Bureau of Mines of Boulder Dam has also demonstrated the feasibility of firing pottery products electrically.

Georgia as usual was the leading producer, with 419,395 short tons, or 66 percent of the total, followed by South Carolina, with 128,199 tons, or 20 percent of the total output and Pennsylvania, with 42,370 tons or about 7 percent of the total kaolin. Other important producing States were North Carolina, Florida, Virginia and California. Since 1931 the total production of Georgia has included certain hard or so-called "flint kaolin" used mainly for refractory purposes. This figure in recent years has varied from about 25,000 tons to slightly over 50,000 tons. A breakdown for refractory and china or paper clay for the years 1932-36 follows the general State table.

Mathieson Alkali Changes

Several changes of interest to the industry have recently been announced by The Mathieson Alkali Works, whose main offices are at 60 East 42nd street, New York. Chief among these is the appointment of Robert M. Mannheim as New England district manager with headquarters in the Hospital Trust Building, Providence, R. I. Mr. Mannheim has been a member of the Mathieson organization for the past six years and has covered the northern New Jersey territory until his recent appointment to the New England managership.

James R. Harrington, who has been covering the New York metropolitan area for Mathieson, will take over Mr. Mannheim's old territory in northern New Jersey, while Donald G. Ross will replace Mr. Harrington in the New York area. Mr. Harrington is a graduate of Washington University, St. Louis, Mo., and a former member of the Titanium Division of National Lead Company, while Mr. Ross received his training at Princeton University and has been until recently a member of Mathieson's New York Office staff.

Production Ratio Report

The following statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3% (c)	76.1%	65.8%	.....
February	90.1% (c)	77.9%	70.0%	.....
March	90.3% (c)	76.0%	70.5%	.....
April	92.1% (c)	82.3%	70.0%	.....
May	90.6% (c)	81.6%	69.4%	.....
June	.....	80.7%	72.3%	.....
July	.....	77.3%	64.9%	.....
August	.....	81.5%	70.9%	.....
September	.....	80.5%	71.9%	58.2%
October	.....	87.6%	75.6%	64.7%
November	.....	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average	.....	81.3%	70.5%	.....
First 25 weeks	90.1% (c)	79.1%	69.3%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1937		CORRESPONDING WEEKS 1936	
*June 5	85.4%	June 6	81.7%
*June 12	87.7%	June 13	81.1%
*June 19	88.7%	June 20	80.5%
*June 26	84.7%	June 27	79.4%

The following statistics show the number of mills reporting by ratio groups:

Ratio Limits	Number of Mills Reporting, Current Weeks: June 5, 1937	June 12, 1937	June 19, 1937	June 26, 1937
0% to 50%	56	52	49	34
51% to 100%	262	263	264	218
Total Mills Reporting	318	315	313	252

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported on January 4, 1937 Machine Improvement Survey.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1937	1936	1935	1934	Mos.	1937	1936	1935	1934
Jan.	80% (e)	61%	61%	....	July	....	69%	59%	....
Feb.	86% (e)	67%	67%	....	Aug.	....	75%	65%	....
Mar.	87% (e)	68%	67%	....	Sept.	....	76%	69%	62%
April	89% (e)	70%	61%	....	Oct.	....	82%	76%	63%
May	86% (e)	68%	61%	....	Nov.	....	79%	70%	56%
June	....	68%	65%	....	Dec.	....	74%	60%	52%

Week end. June 5, 1937—76% Week end. June 19, 1937—71%
Week end. June 12, 1937—82% Week end. June 26, 1937—79%

(e) Basic figures revised to include new members of the National Paperboard Association.

R. Rios Co. Starts in New York

R. Rios Co., Inc., have registered to do business under the laws of the State of New York and established their headquarters at 17 Battery Place.

The interests of this company in the paper business extends over a period of many years, originally starting in Havana, Cuba, fifteen years ago. Activities in Cuba had been confined to acting as commission merchants, selling for account of principals in the United States and Canada.

Rafael Rios is president of the company, Luis R. Rios, vice-president and Jose M. Rios, treasurer. Jose M. Rios will be in charge of the New York office, which will specialize in all kinds of papers and boards.

Blandin Discontinues St. Paul Office

ST. PAUL, Minn., July 6, 1937—The Blandin Paper Company announces that the sales and service office maintained in St. Paul will be discontinued as of June 21, 1937. It is requested that in the future all correspondence be addressed to the Blandin Paper Company, Grand Rapids, Minn.

OFF WITH ITS DOME!

AND in with the chlorine. That may seem to be about all there is to filling liquid chlorine tank cars. But Herbert Hurd, tank car loader at Mathieson's Niagara Fall's plant for twelve years past, will tell you differently—will tell you that his company takes just as much pains to deliver your chlorine in trouble-free containers as it does in producing the chlorine itself.

After every trip, each Mathieson chlorine car is blown off with specially dried air to remove every trace of remaining chlorine; all valves are taken to the shop, reconditioned and carefully tested under pressure; safety valves are removed and tested to insure proper functioning; the car interior is closely inspected. All cars are filled on accurate scales to slightly above the final shipping weight; the excess chlorine is then blown off to eliminate air from lines and valves. A final test with ammonia vapor double-checks the valves and dome connections for any possible leaks.

This whole procedure would mean very little, however, if Mathieson didn't have men like "Herb" Hurd to put it in practice. Skillful, loyal and keenly aware of the significance of their jobs, these men are Mathieson's best assurance to chlorine users of a pure product in trouble-free containers.

The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street **New York, N. Y.**

Soda Ash . . . Caustic Soda . . . Bicarbonate of Soda . . . Liquid Chlorine Bleaching Powder . . . HTH and HTH-56 . . . Ammonia, Anhydrous and Aqua . . . PH-Plus (Fused Alkali) . . . Sulphur Chloride . . . CCH (Industrial Hypochlorite) . . . Dry Ice (Carbon Dioxide Ice)

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Simplified Determination of Resin in Papers and Pulps*

By Herbert F. Launer[1]

Abstract

A method is given for the simple and precise determination of resin in papers which have been surface-sized with glue or starch, coated with casein-clay emulsion, or not surface-sized or coated. The extracting solution is 95-per cent ethyl alcohol acidified with hydrochloric acid in the ratio 4 ml of concentrated HC1:1,000 ml of alcohol. The extract is dissolved in anhydrous ether, so that the usual laborious and time-consuming washing of the ether solution with water to eliminate the nitrogenous sizing or coating materials is avoided. The method is applicable also to the determination of natural resins in wood pulps. The equivalent weight of the extracted resin, based on the oxidation by dichromate, is made the basis for a new criterion of the purity of the extract.

The method in general use at present for the quantitative determination of resin[2] is that of the Technical Association of the Pulp and Paper Industry, known as TAPPI tentative standard T408 m-36, and referred to subsequently as the TAPPI method in this paper. In this method the extracting solvent is acidulated alcohol (95-per cent alcohol, 90 per cent; glacial acetic acid, 0.5 per cent; water, 9.5 per cent; by volume). If nitrogenous materials are present in the paper, the alcoholic solution must be evaporated to dryness and the residue extracted with ether. This ether solution of resin must then be washed with two or more portions of water. If no nitrogenous materials are present, the alcoholic solution is simply evaporated to dryness and the residue weighed as resin.

Since the TAPPI method was used in the present work for purposes of comparison only on materials containing no surface-sizing or coating, such as glue, starch, or casein, the ether extraction was omitted. The alcoholic extracts were filtered, however, the omission of which process constitutes an obvious shortcoming of the TAPPI method. Furthermore, the time of extraction was extended to 2 hours at the rate of 15 siphonings an hour, which is much more than the TAPPI method calls for.

Extraction by the TAPPI method has been shown by Sutermeister and Torrey *(1)* to be incomplete. They developed a method in which they recommended the use of a solution of the composition 25 cc. of concentrated sulphuric acid to 1,000 cc. of 95-per cent ethyl alcohol, and used a preliminary 5-hour period of steeping, and an 8-hour period of actual extraction.

Acidity of the Solvent and the Treatment of the Alcoholic Extract

The function of the acid is to resolve the aluminum-rosin aggregate into its components, thus allowing the rosin to dissolve in the alcohol. According to the work of Sutermeister and Torrey, acetic acid does not furnish sufficient hydrogen ion to accomplish this, which is in accord with the findings of the present work. The use of sulphuric acid requires, however, the long steeping and extraction periods, both of which are somewhat impractical for the routine analysis of large numbers of samples. When sulphuric acid is used, the steeping and long extraction seem to be necessary for the reason that the acid is nonvolatile under the conditions of extraction, and is soon almost completely washed out of the siphon cup. It was found in this laboratory that the sulphuric-acid concentration, initially 0.9*M*, decreases to 0.001*M* in the siphon cup after the first half hour of distillation, when measured with a glass electrode in the presence of the paper.

To obviate these difficulties the strong volatile hydrochloric acid was used in the present work. By the use of this acid the extraction, without preliminary steeping, was found to be practically complete in 2 to 2½ hours. Furthermore, the partial neutralization of the acid before evaporation of the solvent, necessary when sulphuric acid is used, is not necessary when hydrochloric acid is the acidulant, because this acid evaporates along with the alcohol without becoming sufficiently concentrated to attack the resinous material significantly. This was found by separate experiments in which rosin of known weight in alcoholic hydrochloric acid was evaporated to dryness, dissolved in ether, reevaporated, and weighed. The change in weight was negligible when compared with that of the control experiment, in which no acid had been used.

In the present work the simple "Underwriter" equipment was used. When the strongly acidic solution recommended by Sutermeister and Torrey was employed under these conditions, large quantities of the products of the hydrolysis of cellulose, were formed which had to be separated from the resin by the usual water-washing of the ether extract in separatory funnels. To avoid this, it was necessary to use a lower acidity, which would have

* Research Paper RP 973, J. Res. Nat. Bur. Standards 18 (Feb. 1937).
[1] National Bureau of Standards, Washington, D. C.
[2] In this article both natural resins occurring in wood and rosin added to the paper will be referred to as "resin", unless the specific instance requires a distinction to be made.

to be higher than that of the TAPPI solvent, however, to allow acceptably complete extraction. A concentration of hydrochloric acid in the alcoholic solvent, favorable from the standpoints just discussed, was arrived at in the following manner.

The acidity of the TAPPI solvent in the siphon cup was measured with the glass electrode. The hydrogen-ion concentration (more exactly, the activity, calculated directly from the observed pH) was found to be 0.00003*M*. Accordingly, an acidity range above 0.00003*M* was investigated. It was found by trial that a 0.4-per cent (by volume) solution consisting of 4 ml of concentrated (35 to 37 per cent) HCl and 1,000 cc. of 95-per cent ethyl alcohol gave maximum extraction of resin with minimum extraction of other substances. A 1.2-per cent alcoholic hydrochloric acid solution yielded no more resins, but gave a much larger amount of the hydrolysis products of cellulose, which made subsequent steps more difficult. An 0.08-per cent solution gave incomplete extraction (90 per cent) on papers. The pH of the siphon-cup distillate from the 0.4-per cent solution was found to be 2.2, corresponding to an acidity of 0.006*M*.

Finally, the alcoholic extract often contains, along with the resin, finely divided foreign matter. This is best coagulated by dehydration through brief heating of the residue in the drying oven. After this treatment, the resin dissolves readily in the anhydrous ether, and the material which goes into suspension settles out on short standing. The ether solution is then easily filtered.

New Method of Extraction in Detail

Five to seven grams of the paper or pulp is cut into strips approximately 5 by 40 mm and placed lengthwise into the Underwriter siphon cup. The extracting solution is made up in the ratio 4 cc. of concentrated 35 to 37 per cent reagent grade HCl:1,000 cc. of 95-per cent ethyl alcohol. The hydrochloric acid may be omitted in the case of wood pulps.

The extraction process is continued for approximately 2 hours at the rate of 15 siphonings an hour (equal to 500 cc. in the apparatus used) for uncoated and nonsurface-sized papers and pulps, and for 2½ hours when glue, starch, or casein is present. The alcoholic solution is evaporated to dryness, preferably on a steam bath, until acrid odors are no longer noticeable. The residue is then heated in a drying oven at 100 deg. C for 15 minutes. After cooling, 20 cc. of anhydrous ether is added. The resinous material dissolves very rapidly (5 to 30 seconds) but care should be taken that none remains covered by foreign materials. After standing 15 to 20 minutes to further the coagulation and settling out of the foreign matter, if necessary, the ether solution is filtered with suction through a fine-pore filter paper cut to fit a Gooch crucible, directly into a weighed beaker. It is usually necessary to refilter the filtered solution through the same paper. Another 20-cc. portion of ether is used for rinsing. The ether is conveniently evaporated under reduced pressure with the beaker placed in water at 40 deg. C. Fifteen minutes in the drying oven at 100 deg. C will then suffice to remove moisture. Still more rapid, however, is evaporation in a strong current of air, after which the drying time must be lengthened to 30 minutes, as water is condensed from the air by cold ether. The residue is then weighed to the nearest milligram.

If the paper contains fillers, such as ZnS, $CaSO_3$, and $CaCO_3$, that react with acids, the sheet, previously weighed, is dipped into normal aqueous hydrochloric acid solution and allowed to drain for 5 minutes. It is then placed upon a suitable surface and washed free from acid with tap water. After drying, the paper is cut into strips and extracted in the manner just described.

Experimental Results and Discussion

Equivalent Weight of the Extract

It became necessary to test the extracts for the presence of probable foreign substances, such as clay or other inorganic salts, including those soluble in water, the products of the hydrolysis of cellulose, and coating and surface-sizing materials, such as glue, starch, and casein. It was found that a suitable test was the oxidimetric equivalent weight, which is simply the number of grams of the extract which will reduce one equivalent, 49.03 g=1/6 mole, of potassium dichromate, $K_2Cr_2O_7$. The actual completeness of the reaction, that is, whether or not all carbon is oxidized to carbon dioxide, was not investigated extensively, except that acceptable checks were obtained with known weights of various grades of rosin. The equivalent weight of a sample of papermakers' rosin, grade *F*, in the form of an emulsion prepared in the National Bureau of Standards paper mill by saponification with hot sodium carbonate and subsequent dilution, was determined as follows:

5.00 cc. of emulsion was neutralized with 0.4-per cent alcoholic hydrochloric acid, an excess of the latter was added, and the mixture evaporated to dryness on the steam bath. After further drying for 15 minutes in an oven at 100 deg. C and cooling, the rosin was extracted with anhydrous ether. This solution was evaporated, the residue dried as before, cooled and weighed. Twenty-five cc. of concentrated sulphuric acid was then poured over the rosin and allowed to stand 1 hour with frequent agitation. The rosin dissolved without oxidation, as shown by separate experiments wherein the time of standing was increased tenfold with negligible change in the equivalent weight of the rosin. The solution was slowly poured into a 400-cc. beaker containing 30.00 cc. of standard 1.835*N* potassium dichromate solution, 25 cc. of additional sulphuric acid was added, followed by 20 cc. of water, and the solution was kept at 150 to 155 deg. C for 20 minutes, air being constantly bubbled through it to prevent bumping. The solution was then diluted twofold, cooled to 60 deg. C or lower, and the remaining dichromate determined electrometrically with ferrous ammonium sulphate.

The results with this method are shown in table I.

TABLE I.—EQUIVALENT WEIGHT OF A SAMPLE OF PAPERMAKERS' ROSIN, GRADE F, AFTER SAPONIFICATION

Weight of rosin	Volume 1.835*N* dichromate used	Equivalent weight
g	ml	g
0.159	24.1	3.60
.160	24.3	3.57
.160	23.5	3.71
	Average	3.63

The value 3.63 is in good agreement with the equivalent-weight values of the extracts from all types of papers studied (see Table V). An extract is thus considered "pure" in this work if its equivalent weight is approximately 3.6.[2] All of the impurities listed above would raise this value. Clay, if present to the extent of 10 per cent in the extract, would raise it to 4.0. Cold or hot water-soluble materials found by the writer to be present to 1.1 to 1.2 per cent in the soda and sulphite pulps studied, and found to have equivalent weights of 10.1 and 9.0, would obviously raise the value. The same applies to the hydrolysis products of cellulose, which have an equivalent weight of 6.8,[3] the same, of course, as cellulose. Finally, starch has the same value as cellulose, whereas the glue and casein used in the papers have equivalent weights of 7.1 and 5.7, respectively, both of which were experimentally determined in this laboratory.

Pulps and the Uncoated and Nonsurface-sized Papers

Paper Stock With Known Amounts of Rosin

A purified sulphite pulp, known on the market as "alpha pulp", was beaten for 3 hours in a semicommercial beater in the National Bureau of Standards' paper mill. More water was then added until the weight of the stock constituted 2.5 per cent of the whole. The mixture was then stirred for 1 hour, after which 10.00 cc. of analyzed[4] rosin emulsion, prepared in the same paper mill by the usual process, was pipetted in and stirred for 1 hour. Alum solution was then added until the pH became 4.1. After the mixture had been stirred 1 hour more it was filtered on a large Büchner funnel, dried, cut into three equal piles of strips, and analyzed for rosin by the new method. The filtrate, 700 cc., was acidified and the rosin determined by extraction with ether. A like quantity of pulp was dried and analyzed for natural resins.[5] The results are given in Table II.

TABLE II.—ANALYTICAL DATA FOR PAPER STOCK WITH KNOWN AMOUNTS OF ROSIN

Rosin added (g)			0.3490
Natural resins (g)			.0087
Total (g)			.3577
Rosin in filtrate (g)			.0245
Resins in fibers (g)			.3332
Weight of dry cake (g)			17.40
Therefore, resins in cake (%)			1.92
Portions taken for analysis (g)	5.38	5.82	6.20
Resins recovered (g)	.1020	.1095	.1170
Therefore, resins found (%)	1.90	1.88	1.89
Average (%)			1.89

It is seen from the values for the resin present, 0.3332 g, and the resin found, 0.3285 g, that the recovery is 98.5 per cent.

[3] A much paler and better grade of rosin was found to give the equivalent-weight values of 3.38, 3.32, 3.34; average 3.35.

[4] This was determined as follows: Sulphite paper in a siphon cup was steeped overnight in a 3.9-per cent alcoholic solution of hydrochloric acid. The usual process for resin extraction was then carried out, but with this solution, after which the alcoholic solution was filtered, evaporated to dryness, weighed, and the equivalent weight determined. The tarry residue was found to be 8.2 per cent, by weight, of the paper sample. The residue was then oxidized with dichromate as usual.

[4] The rosin emulsion was analyzed as follows: 5.00 cc. of emulsion was pipetted into a separatory funnel containing ether and dilute hydrochloric acid, and shaken. It was washed once more with very dilute hydrochloric acid, and aqueous portions being extracted with fresh portions of ether. Duplicate determinations gave 0.175 and 0.174 g; average 0.1745 g of resin per 5 cc. of emulsion. This analysis was carried out 10 weeks prior to the one described in the preceding section.

[5] The new method was used for the determination of this small quantity. An error of 100 per cent in this value would result in an error of only 0.05 per cent in the resin content of the cake. However, errors inherent in the determination of this quantity would cancel, provided that the same method of analysis is used both for the sized and unsized cakes.

Comparison With the Results of Other Methods on Various Pulps and Papers

The results of the tests are recorded in Table III. The percentage was calculated on the basis of the oven-dry weight of each material. The materials used were no. 1018, a soda pulp; no. 1017, a sulphite pulp; no. 1014, a paper made from old white rags; and no. 879, a paper made from sulphite pulp. The numbers refer to papers used for other experiments (2). The concentration of acids used is expressed in volume-per cent.

The percentages of resin in the pulps determined by the TAPPI method, column 4, are much higher than those found by the other methods, colums 2, 6, and 8. This is due to the fact that the TAPPI extract contains impurities which are carried down by the rather large amount of water present (14 per cent), and also by the alcohol. These impurities are not only visible and impart an inhomogeneous and "dirty" appearance to the residues, but also reveal themselves in the high equivalent weights reported in column 5. That a large part of the impurity is due to water is shown by the lower results with a nonaqueous solvent, column 6.

The failure of the TAPPI method arises from the fact

TABLE III.—ANALYTICAL RESULTS ON PULPS AND UNCOATED AND UNSURFACE-SIZED PAPERS

	New method (0.4% hydrochloric acid)		TAPPI method (0.5% acetic acid)		Absolute alcohol (unacidified)		Sutermeister and Torrey (2.5% sulphuric acid)	
	Resin	Equivalent weight	Resin	Equivalent weight	Resin	Equivalent weight	Resin	Equivalent weight
	Per cent	g	Per cent	g	Per cent	g	Per cent	g
	0.18	3.49	0.50	6.38	0.34	4.88	...	...
	.19	3.87	.51	7.09	.32	4.55	...	...
	...	...	.49	6.60	...	...	...	...
Average ...	.18	3.68	.50	6.71	.33	4.71	...	...
			No. 1017. Sulphite Pulp					
	0.72	3.54	1.06	4.96	0.86	3.65	0.73	3.65
	.73	3.70	1.01	4.96	.82	3.93	.75	3.60
	...	...	1.00	4.80	.80	3.55	.72	3.60
Average ...	.72	3.62	1.02	4.91	.83	3.71	.73	3.62
			No. 879. Sulphite Paper					
	2.46	3.57	2.40	3.71	1.76	3.65	2.56	3.73
	2.56	3.73	2.43	3.76	1.77	3.49	2.56	3.64
	2.49	3.62	2.57	4.04	1.80	3.44	...	...
Average ...	2.50	3.64	2.47	3.82	1.78	3.55	2.56	3.68
			No. 1014. Rag Paper					
	1.92	3.67	1.71	3.65	...	...	1.92	3.64
	1.89	3.57	1.88	3.71	...	...	1.90	3.52
	1.90	3.62	1.88	36.5	...	...	...	...
Average ...	1.90	3.62	1.82	3.67	...	...	1.91	3.58

that all alcoholic solvents also extract materials that are nonresinous, as shown by their insolubility in ether. This is further shown in a consideration of the results with the sulphite paper.

The percentages of resin in the papers, columns 2, 4, 8, using the three acidified solvents are in good agreement. The reason for this apparent contradiction of the findings of Sutermeister and Torrey *(1)* that the TAPPI extraction is incomplete, is immediately indicated by the appearance of the TAPPI residues and by their somewhat high equivalent weights, column 5, showing that impurities are present. This is definitely shown by the following experiments: The extractions by the new method and the TAPPI method were carried out on the sulphite paper. The weighed residues were dissolved in ether, which was then washed with water in separatory funnels, evaporated, dried, and weighed. The paper from which the resin had supposedly been extracted by each method was then subjected to a second extraction, but this time by the new method. The results are listed in Table IV and show clearly that the TAPPI solvent fails to extract all of the resin in papers, and that water-soluble impurities are extracted. The results also show that the extracts by the new method contain negligible amounts of water-soluble materials, and that the extraction is practically complete.

TABLE IV.—EFFECT OF WASHING THE RESIDUES OBTAINED BY THE NEW AND TAPPI METHODS

[The results of second extraction on the sulphite paper]

Method	Resin percentage: Resin not washed with water	Resin washed with water	Second extraction paper by the new method
New	2.47	2.44	0.02
	2.55	2.53	.00
	2.46	2.44	.02
Average	2.49	2.47	.01
TAPPI	2.42	2.17	0.20
	2.46	2.20	.17
	2.59	2.25	.25
Average	2.49	2.21	.21

Extraction by the method of Sutermeister and Torrey *(1)* gave the results listed in column 8 of Table III, which were obtained by using an Underwriter siphon cup, a period of steeping overnight, and a 5-hour period of extraction. The results are in good agreement with those of the new method, which has the advantage of being far shorter and simpler, without sacrifice of accuracy.

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TABLE V.—ANALYTICAL RESULTS WITH SURFACE-SIZED AND COATED PAPERS, USING ALCOHOLIC HYDROCHLORIC ACID (4:1,000)

Kind of coating or surface sizing	No. 879 sulphite paper: Amount of coating Per cent	Resin Per cent	Equivalent weight	No. 1014 rag paper: Amount of coating Per cent	Resin Per cent	Equivalent weight
None [a]	...	2.50	3.64	...	1.90	3.62
Glue	4.1	2.38	...	1.6	1.87	...
	4.0	2.43	...	1.6	1.90	...
	4.0	2.49	...	1.6	1.83	...
Average	...	2.43	3.58	...	1.87	3.56
Starch	4.0	2.45	...	3.5	1.91	...
	4.0	2.38	...	4.0	1.84	...
	4.0	2.37	...	4.0	1.86	...
Average	...	2.40	3.60	...	1.87	3.62
Casein [b]	1.5	2.48	...	1.6	1.94	...
	1.6	2.57	...	1.7	1.98	...
	1.5	2.51	...	1.8	1.92	...
Average	...	2.52	3.56	...	1.95	3.62

[a] Results for the untreated papers were taken from Table III.
[b] The amounts of casein do not include the clay, which was approximately 10 per cent.

Coated and Surface-sized Papers

Further test of the new method showed that the results were not affected by the presence of surface-sizing or coating materials. Ordinarily, the presence of such materials necessitates laborious and time-consuming washing of the ether extracts with water.

All of the results listed in Table V were obtained by the new method. The materials used were the same two papers described in section IV-2-b, p. 232, but surface-sized or coated, either in the Bureau of Standards paper mill as in the case of no. 1014—glue, or by hand in the laboratory, employing procedures [10] in use at this Bureau.

If fillers, such as ZnS, $CaSO_3$ and $CaCO_3$ are present in paper, the acidity of the extracting solvent is changed unless the filler is first removed by dipping in normal hydrochloric acid, washing and drying. Such treatment was found not to affect the resin content of the papers.

[10] For casein see Ind. Eng. Chem. 25, 904 (1933). For glue and starch see footnote 7.

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Pebble-Mill Beating Under Vacuum and Pressure

By Frederick D. Bates, Jr.[1]

The patent and beating-equipment literature contain many references to advantages obtained by beating and jordaning under vacuum and under pressure. Claims for pressure jordaning have been especially numerous recently. In the case of vacuum, the air is supposedly pulled out of the fibers, allowing the water to penetrate; where pressure is used, the water is supposedly forced into the fibers; in either case the beating effect is supposedly increased. It was thought worth while, therefore, to discover whether any evidence of the validity of such claims could be found in the laboratory.

Vacuum Beating

A ½-inch hole was bored in the cover of a regular Abbé pebble-mill jar. ¼-inch pipe was inserted in this hole, made tight by leather gaskets, nuts and washers on either side, and a globe valve fitted on with a close nipple. This was connected, with a union, through a trap to catch anything that might be sucked out, to an oil vacuum pump. A regular charge of bleached sulphite fiber, water and pebbles was placed in the jar, the cover clamped on tightly, and the vacuum pump started. The pressure, as read on the manometer connected to the pump, was quickly reduced to slightly less than the vapor pressure of the water. This vacuum was maintained for 30 minutes. The valve was then closed, the jar and valve were disconnected from the pump, the closure was tested for leaks with water, and the jar placed in the pebble mill frame and turned the specified number of times. At the end of the beating, the jar was again connected with the manometer and the valve opened. The pressure in the jar at this time was about 10 mm. more than at the start of the beat. One, two and three-hour beatings were made and tested.

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Pressure Beating (in porcelain jar)

Pressure beating was tried in the same jar, using the same lot of fiber, connections being made to an air compressor instead of to a vacuum pump. Fifteen pounds pressure was tried. Much difficulty was experienced in getting an air-tight seal. One, two and three-hour beatings were successfully made at this pressure, however, a test with a manometer after beating showing a loss of about 1 pound of pressure.

Results

Hand-made sheets from these beatings were tested and slowness tests were made and compared with the results of beatings of the same lot of pulp in the same jar in the regular way, at atmospheric pressure. These results are given in Table I.

TABLE I.—VACUUM AND PRESSURE BEATING IN PORCELAIN JAR

Absolute Pressure	Time beaten, hours	Williams Slowness	Burst Ratio	Tear Ratio	M.I.T. Fold Ratio	Shrinkage Per cent
13 mm. (Vacuum)	1	16	54.2	2.06	0.43	5.8
15 lb. (Atmospheric)	1	16	55.4	2.27	.50	5.6
30 lb. (15 lbs. gage)	1	16	51.5	2.39	.45	5.3
13 mm. (Vacuum)	2	37	82.4	1.92	1.9	8.8
15 lb. (Atmospheric)	2	35	84.2	1.76	3.5	8.8
30 lb. (15 lbs. gage)	2	35	87.0	2.15	3.8	8.8
13 mm. (Vacuum)	3	116	98.1	1.45	8.1	13.3
15 lb. (Atmospheric)	3	101	99.4	1.56	8.2	13.2
30 lb. (15 lb. gage)	3	131	106.3	1.37	8.3	14.0

The differences here are clearly close to the limits of experimental error. No definite trends are shown, and it appears that beating at plus or minus 15 pounds from atmospheric pressure gives the same results as ordinary beating.

Nothing further could be done with the vacuum, but it was thought possible that higher pressures might show something of interest.

Pressure Beating in Iron Jar

As the regular pebble mill jars are not built for pressure,

a special jar was needed. This was made as follows. A 6½ inch length of six-inch iron pipe was capped at both ends. The cap at one end was welded on, the other was threaded. Two lugs were welded on each cap so that one end could be clamped, and the screw cap on the other end be taken up tightly with the aid of a length of shafting. The screw cap was tapped and a ⅛-inch pipe screwed in and soldered. This pipe was connected, by way of a valve and suitable fittings, to an air compressor. A pressure of 60 pounds was selected more or less arbitrarily as being about as high as would be used in practice.

When the compressor gage showed 60 pounds, the valve at the jar was closed and the jar removed and placed under water to test for leaks. Considerable difficulty was experienced in getting the cap tight enough to hold 60 pounds. Rubber gaskets were quickly chewed up by the pipe, and hard gaskets were not flexible enough to fill in irregularities in the fit. This problem was solved by putting a rubber gasket in the cap first, as a cushion, with a hard Garlock gasket between it and the pipe to protect the rubber.

This iron jar had a smaller capacity than the regular porcelain jars. Consequently, smaller amounts of pebbles, water and fiber had to be used. A comparison of these follows:

	Porcelain Jar	Iron Jar
Capacity, cc.	4350	3100
Number of stones	156	107
Weight of stones, grains	3700	2585
A.d. weight of pulp, grams	50	35
Water, cc.	1400	980

One-, two-, three-, four-, and six-hour beatings were made in the iron jar, at atmospheric and at 60 pounds pressure, using the same lot of sulphite fiber. Some iron was necessarily ground from the jar, in amounts increasing with the time of beating, and gave a brownish color to the sheets. The one-hour sheets were only slightly discolored; the six-hour sheets were the color of a light kraft. However, the atmospheric and 60 pounds pressure sheets were well matched in color for a given beating time, so that any error introduced by this iron was doubtless cancelled out. The results are shown in the following table:

Time beaten, hours	Gage pressure, pounds	Williams slowness	Burst ratio	Tear ratio	M.I.T. fold ratio	Shrinkage, per cent
1	0	13	31.4	1.88	0.10	4.9
1	60	13	32.2	2.05	.11	4.8
2	0	20	59.9	2.42	.49	6.7
2	60	21	58.3	2.25	.44	6.9
3	0	38	74.1	1.79	1.06	8.6
3	60	38	65.3	1.88	.81	8.2
4	0	68	84.6	1.65	3.0	10.3
4	60	82	92.3	1.32	2.8	11.6
6	0	625	92.8	1.49	13.0	20.1
6	60	735	97.4	1.49	14.0	22.0

No definite differences in the development of any of the properties can be established from these results. Most of the differences are within experimental error, and those that seem more appreciable are not consistent enough to establish a definite trend. The four- and six-hour beatings might be interpreted as showing an advantage in beating rate for the pressure beatings were it not for the four-hour fold, which differs in the wrong direction, and the six-hour tear, which shows no difference. Even if these discrepancies are disregarded the small differences in the other properties would not seem to be sufficient to warrant installation of pressure beating or jordaning equipment in the mill.

Conclusions

As far as can be told from laboratory pebble-mill tests, no different effect of significant magnitude is obtained by beating under a vacuum, or at 15 or 60 pounds pressure, compared to that obtained by beating at atmospheric pressure.

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Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Cellulose

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and moist air, water, formamide, aqueous lithium thiocyanate and aqueous sodium hydroxide solution, and for natural cotton, hemp, and flax fibers in dry and moist air. The curves obtained are of the same form except in cases where combination occurs (lithium thiocyanate and sodium hydroxide). The rapidity with which load-elongation cycles attain their final form increases with the degree of perfection of the crystalline orientation in the original fiber, and experiments of this kind can be used to identify different natural fibers.—A.P.-C.

Molecular Structure of Cellulose. I. Review of Current Theories. C. F. Davidson. J. Text. Inst. 27: P144-158 (1936).—A review.—A.P.-C.

Lignin

Determination of Lignin by the Sulphuric Acid Method. Willibald Ender and Otto Uebel. Cellulosechemie 17, no. 10:102-107 (Oct. 4, 1936). Lignin determinations of spruce, pine, and beech with 72% sulfuric acid at various temperatures and for different periods show that it is possible to hydrolyze the cellulose and hemicelluloses in a few hours, but that, when the action of the acid continues for too long a time, the yield of lignin increases by the formation of humic acids. Hydrolysis of the dextrins is necessary, but when this hydrolysis is carried out in the presence of the hydrolyzed carbohydrates the values for lignin are about 0.5-1% too high. This error, however, is compensated by the loss of methoxyl groups of the lignin. —C.J.W.

Xylan from Straw. R. S. Hilpert and A. Oelmann. Cellulosechemie 17, no. 11/12:1243-125 (Dec. 13, 1936). Straw xylan prepared according to Heuser always contains methoxyl (2.1%). On treatment of this xylan with mineral acids under the conditions used for the lignin determination, a "lignin" is formed having a methozyl content of 11.6%. 20% of the methozyl present in the xylan is recovered in the "lignin." It therefore seems that xylan is not uniform but consists of components which behave differently towards mineral acids. The reaction with hydrochloric acid differs from the reaction with sulfuric acid. Completely methylated xylan (MeO, 29.82%) gives a "lignin" containing 13.8% methozyl with 42% hydrochloric acid.—C.J.W.

Alkaline Decomposition of Spruce Wood. R. S. Hilpert and O. Peters. Ber. 70B, no. 1:113-116 (Jan. 6, 1937). When spruce wood (mechanical pulp) is heated with 35% sodium hydroxide solution at 100°, not more than about 20% is dissolved without any change in the composition of the wood. Using 50-60% sodium hydroxide solution, 55% of the wood dissolves, again without any remarkable change in the composition of the residue, except that the methoxyl content increases somewhat. The lignin number (24.5%) and the methoxyl content of the lignin (14.3%) also prove that no change in the composition of the residue has occurred. After three such treatments the yield of the residue is 17% and its composition (MeO 1%, lignin 1.9%) approaches that of the cellulose. No decomposition of the cellulose has taken place, because if the experiment is carried out at a higher temperature (110-115°) for twelve hours with potassium hydroxide solution, 45% of a cellulose-like product is obtained. The composition and yield of the reaction products therefore depend upon the temperature. According to these results, the process should not be considered as one of solution, but rather a decomposition of a large molecule, which may proceed in different ways, depending upon the experimental conditions. From the alkaline solution 70% of the dissolved material may be precipitated by means of alcohol. This precipitate may be separated into two fractions, one soluble and the other insoluble in water. Both are white powders containing 2-3% methoxyl and 46-47% carbon. With 42% hydrochloric acid they yield lignin with 10.6-11.7% methoxyl. Only 50-60% of the methoxyl present in the products is recovered in the lignins, while in the case of the original wood all is found in the lignin. That can be understood if we assume that scission products and not constituents of the wood are present and that these behave differently towards acids. It is particularly interesting that with concentrated acids the part soluble in water gives lignin. From these results the following conclusions are drawn: the action of concentrated alkalies varies according to the conditions used; the process should not be considered as the dissolving of a part of a heterogeneous substance but as a scission of a larger complex; neither 45% cellulose nor 30% lignin are pre-formed in the wood; lignin containing methoxyl can be obtained from carbohydrates containing methoxyl by the action of acids; hence, on treatment of wood with acids, lignin is obtained in the same way.—C.J.W.

Benzylated Spruce Wood. R. S. Hilpert and O. Peters. Ber. 70B, no. 1:108-113 (Jan. 6, 1937). Spruce wood is benzylated by means of 35% sodium hydroxide and benzyl chloride in a steel ball mill at 90-100°. The composition of the benzylated spruce meal (C 70.3, H 6.9%) is the same as that of benzylcellulose (C 69-72, H 6.5%). The product is not uniform and can be separated into two fractions on extraction with benzene-alcohol or acetic acid. These fractions have a different carbon content but this does not exceed the value found for benzylcellulose. In both cases the soluble portion has the higher carbon content. Since benzylcellulose is soluble in benzene-alcohol mixtures, only 24-30% of the benzylated wood behave as benzylcellulose. These products are compared with benzylated alkali and Willstäatter spruce lignin. The benxylated lignins have a much higher carbon content than the fractions from the benzene-alcohol extraction, and the insoluble portion has a lower carbon content than the soluble part. No concentration of lignin can have occurred in the separation. Therefore, it is impossible that lignin is present in wood in a chemically pure or enriched state, as it should be in the middle lamella. The results indicate that the components of the benzylated spruce wood are derivatives of a highly molecular substance, which have their specific characteristics and not those of the cellulose. The decomposition of benzylated spruce wood leads to the same conclusions. Benzyl spruce wood is not attacked by hot sodium hydroxide, and super-saturated hydrochloric acid dissolves about one-third, giving a residue partially soluble in methanol. This residue has not the properties or the composition of benzyl lignin.—C.J.W.

Lignin Problem. Carl G. Schwalbe. Cellulosechemie 17, no. 11/12:113-123 (Dec. 13, 1936).—A discussion of the more recent work on lignin; 67 references.—C.J.W.

Studies on Lignin and Related Compounds XXVI. The properties of Spruce Lignin Extracted with Formic Acid. George F. Wright and Harold Hibbert, J. Am. Chem. Soc. 59:125-130 (Jan., 1937).—The extraction of spruce woodmeal with boiling formic acid is described. A comparison of active hydrogen determinations with the results of alkaline methoxylation throws doubt on the hitherto assumed reliability of the latter as an agent for the proof of lignin structure. The presence of carbonyl in lignin is confirmed.—A.P.-C.

Raw Materials

Cut Blocks or Logs. J. K. Sandmo. Papir-J. 24, No. 23:272-273 (Dec. 15, 1936). The advantages and disad-

vantages are discussed of delivering pulpwood to the mill in the form of short sap-peeled blocks as compared to the whole logs. Logs can be floated which is cheaper than transport by train required by cut wood; water transport involves, however, sinkage losses. The evaluation of wood quality is far easier in the case of cut blocks and thinnings can be utilized for this purpose. However, the method of logging sap-peeled wood is limited to such a short season, that in forestry practice it will never be possible to adopt this method exclusively, even if its advantages are quite obvious.

The structure and Properties of Spruce Wood and Other Types of Pulp Wood. R. Trendelenburg. Papier-Fabr. 34, no. 43:389-396; no. 44:401-407; no. 45:411-416; no. 46:421-426; no. 47:433-435 (Oct. 25—Nov. 22, 1936). The article is a review and thorough study of our present knowledge of the relationship between yield and nature of chemical and mechanical pulp, and such properties as weight per unit volume, fiber structure, width of annual rings, percentage of spring and summer wood, etc. Even sound and straight grown pulp wood is a little homogeneous raw material whose properties vary within wide limits according to habitat, surroundings, and district. Spruce, fir, and pine are discussed as representatives of conifers, and data on aspen, birch, and beech are given as the most important deciduous woods for pulp manufacture. Brief reference is made to the influence of defective wood, such as compression wood, branches, etc. It is incorrect to believe that the quality of wood does not play an important part in the conversion process to rayon. Uniformity of the raw material is decisive for the properties of the pulp, and weight per unit volume for the yield. Future forestry problems are, therefore chiefly concerned with producing sound, straight grown wood with as few branches as possible. Methods for stimulating quick growth will hardly produce a high grade raw material. Special reference is made to economic problems for increasing the German supply of home grown raw materials. Numerous illustrations, tables, graphs, and a bibliography of 42 literature references are included in the article.—C.J.W.

Ring Width and Summer Wood Percentage of the Wood Samples Investigated by Dr. Sieber. A Contribution to the Study of Ring Width and Summer Wood Percentages in Pulp Wood. Papier-Fabr. 34, No. 50:-484-490 (Dec. 13, 1936). Wood samples from Sieber's study (see previous abstract) were examined with regard to ring width and percentage of summer wood. Heavy wood is very uniform in growth with narrow rings; medium heavy wood is irregular in construction with narrow and wide rings; light woods are of regular growth with very wide annual rings; the percentage of summer wood is small, on the average not more than 8%. The summer wood in heavy wood varies between 7 and 40% (20% as mean), in medium wood between 6 and 32% (18% as mean). The difference between the two last types is not great and a good illustration of the fact that, for evaluating wood by its appearance, it is necessary to consider ring width and summer wood percentage together. —C.J.W.

Influence of Wood Density Upon Pulp Yield and Strength Properties in the Sulphite Cooking Process. Rudolf Sieber. Papier-Fabr. 34, no. 50,478-484 (Dec. 13, 1936). Cooking experiments with light, medium, and heavy wood samples from various German districts were made for the purpose of studying the relationship between wood density and pulp yield. The author found that denser wood gives a somewhat higher pulp yield under identical cooking conditions. The disintegration does not proceed at a slower rate, even the reverse could sometimes be observed. Strength properties of pulps from dense wood are somewhat higher in the beaten condition; however, satisfactory strength properties were also obtained with pulps from lighter wood. Woods grown under different conditions and in various districts, but with approximately identical density, showed similar behaviour during cooking with regard to sulfur consumption, pulp yield, and cooking degree.—C.J.W.

Yield of Spruce-Hemlock stands in the Pacific Northwest. Stanton B. Hayward, Pacific Pulp Paper Ind. 10, No. 7: 38-41 (July, 1936).—A brief digest of the results of the investigation made by the Pacific Northwest Forest Experiment Station of the growth and yield of Sitka spruce-western hemlock type of pulpwood stands.—A.P.-C.

Pulpwood Transportation. J. V. Martin, Paper Trade J. 104, No. 1: 37-38 (Jan. 7, 1937).—A brief discussion of the relative merits and disadvantages of rail, truck and marine transportation of pulpwood.—A.P.-C.

Structure of Straw, Esparto, Flax and Cotton Fibers. R. Michel-Jaffard. Chimie et industrie 36: 879-887 (Nov., 1936.)—The ordinary micrographic characteristics of straw, esparto, flax and cotton are in contradiction with the analogies and divergences in their technical properties. The x-ray diagrams of the dry plants explain only part of these relationships and contradict others. A moderate treatment with cuprammonium solution permits of grouping them in accordance with their technical qualities—straw with flax, and esparto with cotton; the first two are characterized by separation into layers parallel to the axis, while the last two exhibit regularly recurring deformations of the lumen. It is suggested that these deformations reveal differences in the softening by water of the different structural elements. The hypothesis is in agreement with the manner in which the fibers are deformed by folding and by torsion under water, straw and flax fibres being characterized by their stiffness, and esparto and cotton by their softness and flexibility, which can be explained by the biological functions of the respective fibers. This can be correlated with the purely physical theories of paper properties, so as to explain the real relations between the structures of the four fibers under consideration and their paper making qualities.—A.P.-C.

Pulps from the Whole Cotton Plant. Comparison of Soda and Nitric Acid Pulps. A. R. Macormac and F. K. Cameron. Ind. Eng. Chem. 29: 96-97 (Jan., 1937).—Whole cotton plants, ground in a hammer mill and extracted with carbon tetrachloride to remove oil, can be pulped either with caustic soda or with nitric acid to give a product with an alpha-cellulose content suitable for rayon and other industrial uses. The pulp from the nitric acid process appears to be the better of the two.—A.P.-C.

Wood Pulp for the Rayon Industries. L. Hebbs. J. Text. Inst. 27: P. 169-180 (1936).—A description of the properties required in bleached wood pulp for the viscose process.—A.P.-C.

Process for Obtaining White Pulp from Printed Waste Papers. Establissements Victor Weibel. Fr. pat. 804-187 (July 12, 1935).—Waste paper is treated in a beater or the like with an aqueous soap solution (10 to 20 parts of soap per 100 parts of waste paper); after complete disintegration the clean pulp is separated from the liquid by means of a press, filter, etc., and washed. The soap may be recovered by precipitating with calcium chloride, liberating the fatty acids with a strong acid, and saponifying.—A.P.-C.

Mechanical Process

Grinding Characteristics of Various Woods. R. I. Wynne-Roberts. Paper Trade J. 104, No. 6: 46-48 (Feb.

11, 1937).—A brief account and discussion of a large number of grinding tests conducted with a number of different woods using a self-contained 3-pocket grinder installation. Of the numerous factors controlling the quality of the pulp, some, such as stone speed and type of burr used, can be independently controlled; others, such as unit pressures of the wood on the stone and grinding temperature, can be held to average values; still others, such as power consumed per ton of pulp and strength-freeness relationship, are intrinsic to the species of wood and to the interaction of the type factors previously mentioned.

The Fractionation of Mechanical Pulps and Its Relation to Refining. Paul D. Bray, Robert A. Thompson and Jiun Shyr. Paper Trade J. 104, No. 5: 33-34 (Feb. 4, 1937).—For a definite type of pulp, the Appleton selective screen will fractionate the pulp reasonably accurately and therefore is valuable as a control test in pulp manufacture. Fine screen rejections should be refined and used, thus saving good pulp wood. The use of the Appleton selective screen as a control test of refining is of value.—A.P.-C.

Alkaline Process

Manufacture of Chemical Wood Pulp. Investigation in Australia. R. B. Jeffreys. J. Proc. Austral. Chem. Inst. 3: 297-313 (1936).—Methods of pulping, bleaching, and evaluating chemical wood pulps are discussed. Australian *Pinus radiata* yields a satisfactory kraft pulp, but for the sulphite process the trees must be cut before much heartwood is formed, in order to minimize trouble from wood resins. The age at which heartwood develops varies considerably; trees 15 to 18 yrs. old were relatively free, whilst others 13 yrs. old contained considerable amounts. The sulphite process is unsuitable for Australian eucalypts owing to the tannin content and the resistance to bleaching, but pulps made by the kraft process are bleachable if derived from wood which is not too dark originally. Although the pulping characteristics vary considerably according to age and locality, kraft eucalypt pulps have a higher yield than those from kraft spruce, the mean fiber length being less and the length: diameter ratio similar. The high strength is due to the presence of binding materials rather than to the inherent strength of the fiber, and maximum tearing, bursting and tensile strengths are developed concurrently, but require wet-beating.—A.P.-C.

Manufacturing a Cotton Fiber-Like Material from Straw. Soai Tanaka. U. S. pat. 2,065,877 (Dec. 29, 1936).—Alpha-cellulose, obtained by digesting straw with alkali, is heated in presence of "Nibé" (the liquor extracted from the vegetable glue *Hydrangea paniculata siet* used as sizing material in making Japanese paper) and myrrh, and after gelatinizing it by treatment with hydrosulphites such as rongalite ($CH_2O.NaHSO_2.H_2O$), bleaching it with bleaching powder and then adding ammonium carbonate and collecting the fiber.—A.P.-C.

Chemical Pulping Process. George A. Richter, assignor to Brown Co. U. S. pat. 2,065,396 (Dec. 22, 1936).—Chipped wood or other cellulosic raw material is exposed to an atmosphere of moist hot sulphur dioxide gas for at least 1 hr. preparatory to cooking with an alkaline liquor.—A.P.-C.

Dorr Continuous Causticizing System. Anthony Amable. PAPER Mill 59, No. 41: 34, 42 (Oct. 10, 1936).—A description of the installation at the Savannah mill of Union Bag and Paper Corp.

Evaporation of black liquor in multiple effect evaporators and the utilization of the heat of the waste gases from the soda oven in the evaporator units and economizer. J. H. BOIJA. Svensk Pappers-Tidn. 39, no. 22:405-412 (Nov. 30, 1936).—The article discusses the great difference in the cost of evaporating weak and strong black liquor from the diffusers. The heat requirement and cost of liquor evaporation can be considerably decreased when the evaporating plant operates in cooperation with the soda furnace and digester house. The article describes a number of possibilities, with several modifications, for obtaining a favorable heat balance with varying types of equipment, degrees Baumé of the black liquor, temperatures, etc. Curves and tables help to illustrate each suggestion.—C.J.W.

Remarks Concerning Industrial Evaporation. Torbjorn Molin. Svensk Pappers-Tidn. 39, No. 21: 386-387 (Nov. 15, 1936).—Since each evaporating unit is designed for a certain definite liquor volume to be handled, the economical and efficient operation of the evaporators depends upon the accurate feed of a definite liquor quantity. The article ascribes the formation of incrusting layers upon the heating coils either to too much or too little black liquor supplied, and points out that the usual check valves which regulate the flow to the units are not suitable for this purpose. Brief reference is made to another more satisfactory arrangement which is also illustrated by a diagram.—C.J.W.

Recovery of Organic Constituents from Black Liquor. Ralph H. McKee. U. S. Pat. 2,063,177 (Dec. 8, 1936).—The concentrated black liquor is mixed with crude potash solid or solution and delivered in a thin layer (about 0.25 in.) on to a rotating oil-heated cylinder where it is heated to about 230° C. for 5 to 10 min. The dry fused mass is dissolved in boiling water, and the crystals of sodium oxalate which separate on cooling are separated by filtering. The filtrate is treated with slaked lime and the precipitated calcium oxalate filtered out.—A. P.-C.

Sulphite Process

Investigations on the Manufacture of Straw Pulp by the Sulphite Process. M. Brot. Papeterie 58: 1056-1066 (Dec. 10, 1936)—Cornelius Lavitsky's thesis work at the Grenoble School of Paper Making led to the following conclusions: (1) By treatment with sulphurous acid or with alkali or alkaline-earth bisulphite, either alone or preceded by treatment with dydrofluoric acid, straw yields a pulp that gives no color with phloroglucinol or with Herzberg's reagent. (2) These pulps remain yellowish, irrespective of the conditions of treatment. (3) The residual yellowish coloration is due to coloring matter of the carotene type in the epidermal vessels. (4) To reduce the yellow color to a minimum, calcium bisulphite cooking must be carried out with a liquor having very definite total and free sulphur dioxide contents, which were determined by means of a systematic series of experimental cooks. (5) The unbleached pulps have physical properties which render them suitable for the manufacture of several grades of colored papers. (6) The unbleached pulps yield good grades of bleached pulp on treatment with a slight excess of bleaching powder. (7) Microscopical examination of the bleached pulp reveals the presence of a small amount of yellow epidermal elements resistant to the action of calcium hypochlorite. (8) On a commercial scale the proportion of bleaching powder used must be reduced. (9) This may be obtained by treating the unbleached pulp with weak, boiling sodium hydroxide solution (on the average, about 1.40 per cent caustic soda on the weight of unbleached pulp) before bleaching. (10) The average consumption is 4 per cent of available chlorine or 12 per cent of bleaching powder. (11) The average yield (on a laboratory scale) of bleached pulp is 45 per cent. The process is commercially practical. Its merits are pointed out.—A.P.-C.

Instrumentation Studies. XVII

A Study of the Transparency of Tinted White Glassine Papers and the Development of an Instrument for its Measurement

By The Staff of The Institute of Paper Chemistry

One of the major use requirements of a glassine sheet is that it should be transparent. The discussion in this report will be limited to the consideration of the optical properties of the sheet which influence its transparency.

After much discussion with practical paper makers as to what they meant by the question "Which of these two sheets of paper is the more transparent?", it was decided that Webster's definition of "transparent" would provide the most consistent answer to the above question. Consequently, throughout this report the expression "visual transparency" or "transparent" will be used interchangeably to mean "having the properties of transmitting rays of light so that bodies can be distinctly seen through." To be sure, the visual estimate of transparency does not concern itself with this definition alone, but includes the observer's estimate of the quality of the sheet as a uniform piece of paper, in addition to its transparent qualities, or "see through".

The process of visually judging two sheets for relative transparency consists in placing them in contact with a printed page of black letters on a white background. If the papers are of nearly equivalent high transparency, the most striking difference between the two sheets will be the grayish appearance of the black print. This grayness may arise in two ways. First, the letters may appear uniformly gray, or there may be small and unequally spaced bright points which contribute to a grayish overall appearance of the letters. This difference is enhanced when the printed letters are of large area. The inverse case, in which the printed page is formed of white letters on a black background, demonstrates very strikingly the importance which the visual judgment of transparency allots to this gray appearance of the printed black letters. Attention is fixed on the grayish appearance of the black letters because there are very small differences observable between the white backgrounds. The principal difference that arises between the appearance of the two backgrounds is that of the hue of the background. The observer oftentimes will prefer one sheet to the other due to its pleasing hue or shade of the white background.

Now assume that the difference between the two sheets as observed when the sheets are in contact with the background is very small. Further differences which will help to distinguish between the two sheets will be found upon separating the sheets from the printed background. As the distance between the sheet and the background is increased, the images of the boundaries of the printed letters become diffuse. If attention be fixed on two printed lines of widths equal to the distance between them, the sharp boundaries will become diffuse as the distance between the background and the sheet is increased, until at some distance it will be just possible to resolve the two lines. This distance at which the lines are just resolved will, in general, be different for the two sheets in question. The sheet for which this distance is the larger may be taken as the more transparent. Hence, the distance between the printed background and the transparent sheet for which two black line images are just resolved may be taken as an index of the transparency of the sheet. The principal objection to the use of such a distance as a measure of transparency is that the end points are not sharp. Consequently, sizable fluctuations will occur for successive observations on the same area of the sheet.

From the preceding discussion it is seen that the judgment of "see through" is based on the observation of the relative grayness of the printed black background, in addition to the diffuseness of sharp boundaries for the case in which the sheet is separated from the printed background.

The factors which are included in the visual estimate of the uniformity of the glassine sheets are the following: First, the uniformity of the sheet is based on the estimate of the uniformity in both size and spacing of the surface marks; second, the uniformity of transparency over small areas, which in many cases appears in the form of streaks of high and low transparency; third, the uniformity of the fogginess of the body of the sheet itself or the diffuse transmittance which visually appears to be distinct from the surface markings. This last factor apparently is conditioned by the uniformity of the formation of the sheet. Examples arise in practice in which a single instrumental measure of transparency does not include an estimate of the uniformity of the sheet. For example, two sheets may give equivalent instrumental measures of transparency for the cases in which highly transparent streaks of one quarter-inch spacing alternating with less transparent streaks occur for one sheet, while for the other sheet there is uniform transparency equivalent to the average of the transparency of the streaked areas of the first sheet. In addition to these factors, two sheets of equivalent transparency when pressed between two plates of glass will be rated as more transparent in proportion to the lack of cockle of the sheet.

The Optical Properties of the Sheet Which Influence Its Transparency

Consider a piece of transparent paper as a medium transmitting light. For purposes of argument, the sheet may be illuminated with light of angular distribution of intensity corresponding to parallel illumination, diffuse illumination, or completely diffuse illumination. Parallel illumination obtains for the case in which all of the light rays incident on the sheet are parallel to each other. Completely diffuse illumination represents the case in which the light rays fall on the sheet from all possible directions and the intensity of the beam varies with the angle of illumination according to Lambert's cosine law. Diffuse illumination represents the case in which the illumination is neither parallel or completely diffuse. Common methods of illumination, either natural or artificial, are of this type.

For each type of illumination, the light will leave the sheet either by reflection or transmission. Here again, the angular distribution of intensity of the light which is either reflected or transmitted must be considered. The light which leaves the sheet at an angle of reflection equal to that of the incident light is specularly reflected. The light which is reflected at angles other than the angles of specular reflection is diffusely reflected. The transmitted light may leave the sheet in directions parallel to that of the incident direction or in any other possible direction. The light which leaves the sheet parallel in direction to

the incident light is parallel transmitted light. The remaining portion of the transmitted beam is diffusely transmitted light. The ratio of the energy of the parallel transmitted light to the energy of the parallel light incident on the sheet, when expressed on a percentage basis, is called the parallel transmittance of the sheet. Similarly, the ratio of the total energy of the transmitted light to the energy of either the parallel or diffuse incident energy is taken as the total transmittance of the sheet.

The three processes by which energy is lost from a well-defined parallel beam of light incident on a small volume of paper are by specular reflection, by scattering, and by absorption. The light which is scattered by this small volume may proceed in a direction making any angle with the incident direction, depending on the nature of the small volume considered. The light which is lost by absorption is converted into heat. In other words, the light which is scattered will find its way out of the paper in some direction, while the light which is absorbed never leaves the paper except by a possible fluorescence process. It will be assumed here that no fluorescence is involved.

Summarizing the two preceding paragraphs, we have to consider the following quantities:

Reflected light
- *a.* Diffusely reflected
- *b.* Specularly reflected

Transmitted light
- *a.* Parallel transmitted
- *b.* Diffuse transmitted

Light lost from the incident beam
- *a.* Specular reflectance
- *b.* Absorption
- *c.* Scattering

In general, the incident light is diffuse. For the purpose of argument it will be assumed that the incident light is limited to a parallel beam or practically a close approximation thereto. It is assumed that light of intensity I_0 per sq. cm. is incident on unit area of the sheet. The effects of specular reflection are neglected. Fix attention on a small volume of thickness dx and unit area. The following definitions are necessary for the discussion:

u is the fraction of the incident parallel beam lost per unit volume of the sheet by the process of absorption.

s is the fraction of the incident energy lost per unit volume by scattering into all angles.

Then the energy lost by the parallel beam in traversing the thickness dx of the sheet is

$$dI = -I.u.dx - I.s.dx. \tag{1}$$

Equation (1) becomes, upon integration,

$$I = I_0 e^{-(u+s)x}. \tag{2}$$

This equation can be rewritten as

$$I = I_0 e^{-ux} \cdot e^{-sx},$$

or

$$I = I_0 A \cdot S. \tag{3}$$

In the last equation, $(1\text{-}A)$ represents the fraction of light energy lost by absorption in the total thickness of the sheet. The fraction $(1\text{-}S)$ is the amount lost by scattering. The essential point here is that, in consideration of the intensity of the parallel transmitted light, the scattering and the absorption may be considered as independent and separable processes.

In order to speak more accurately of the theory behind the actual observation of transparency, and to deal with quantities which are actually measurable with simple experimental set-ups, the relation existing between the absorption and scattering coefficients must be considered for the total transmission. The most complete theory of the scattering of light in media which can be definitely connected with the paper problem is contained in a paper by J. W. Ryde *(1)*, in which he gives the following expression for the fraction of the light totally transmitted for a parallel incident beam:

$$T' = \frac{QK + Pe^{-q'x}NB\sinh KX}{(u+NB)\sinh KX + K\cosh KX} - (Q-1)e^{-q'x}, \tag{4}$$

where
u = absorption coefficient per unit volume;
B = fraction of light scattered backwards (diffuse illumination);
B' = fraction of light scattered backwards (parallel incidence);
F = fraction of light scattered frontwards (diffuse illumination);
F' = fraction of light scattered frontwards (parallel incidence);
N = number of scattering particles per unit volume;
$K = [u(u+2NB)]^{1/2}$;
$q' = u + N(F' + B')$
X = thickness of the sheet
$Q = [2uF' + N(B+F')\ (F'+B')]\ /\ [2uF + N(F'+B')^2]$
$P = N(B-B')\ (F'+B')\ /\ [2uF + N(F'+B')^2]$

There are approximations that may be made which simplify the form of the expression for the case in which the absorption coefficient is small compared to the scattering coefficients. However, for the case of glassine sheets, this assumption is not valid in the region of high transparency. A test of the theory could possibly be made experimentally with an enormous amount of effort. In order to do this, it would be necessary to determine the absorption and scattering coefficients. In principle, the methods involved for this determination are straightforward.

The points to be observed from the above relation are, first, that the expression is for the total transmission, and contains no factor explicitly containing the angles between the incident and the transmitted rays. Such a factor may be arbitrarily introduced for the sake of description of experimental results. The angle between the transmitted and incident beams is θ. The expression for the light transmitted per unit angular range of θ is

$$T\ (\theta) = F(\theta)T'$$

The theoretical calculation of this angular factor is made awkward by the need of an expression involving the differential forms of the B's and F's as functions of θ.

The second essential feature of the expression for T' is that it is not possible to consider the effects of absorption and scattering coefficients separately, as was possible in the case of the expression for the parallel transmission. In the arguments to follow relative to the experimental determination of parallel and total transmission, a value of $F(\theta)$ will be assumed to be derivable from the experimental study of the angular variation of transmission.

Thirdly, it must be recalled that the expression for T' holds for a monochromatic beam.

Fourthly, in the derivation of this formula, boundary conditions have been neglected to the extent that the contribution from internal specular reflection in the sheet has been neglected. These contributions have been calculated by Ryde *(1)* for the case of opal glasses. For the case of the specular reflection of the diffusely scattered light contributions of as much as 10 per cent may be expected from the internal reflections for a substance of index of refraction approximating that of cellulose.

The main purpose of presenting this resume of the existing theory of transmission of light, which might be extended to the study of a sheet of paper, is to show that *a priori* arguments as to estimates of the changes to be expected in the total transmission are really guesses.

A similar expression for the fraction of the light reflected has been derived. It shows the same awkwardness as regards experimental interpretation as does equation (4).

The next step to be taken is the consideration of the process of judging transparency so that the best functional relation between the experimentally measurable quantities, diffuse reflectance, parallel and diffuse transmittance, and absorption, may be set up. From now on, the angular variation of the quantities must be closely considered.

Generally speaking, the first quantitative expression to represent the transparency of a sheet would be the total

transmittance of the sheet. This is, of course, chosen on the ground that the greater the percentage of the total light transmitted by the sheet the better would be the "see through". Actually, as will be shown later by experimental data, there is a fairly smooth relation between visual transparency and the total transmittance of the sheet. However, the rate of change of total transmittance with visual transparency for the range of the highly transparent papers is not sufficiently great to separate the sheets as well as may be done visually.

The second choice of a quantitative relation expressing transparency is the contrast ratio as determined by some instrument which will measure the ratio of the reflectance of the sheet placed over a standard black surface to the reflectance determined by backing the sheet by a standard white reflecting surface. The reflectance in these cases is determined from the diffuse reflectance averaged over all angles excluding the angles of specular reflection. MacNicholas *(2)* has shown that the diffuse reflectance so determined is the reciprocal situation to the case for which the sample is diffusely illuminated and viewed with a reflected light beam of small solid angle.

Dan B. Wicker *(3)* has arrived at a quantity called "image visibility" as a quantitative representation of transparency. The argument underlying the choice of this quantity will now be developed in terms of the process of visually judging the transparency of a sheet and the measurable transmittances and reflectances.

Both the choice of contrast ratio and image visibility are founded on the same fundamental basis. Assume a transparent sheet to be illuminated by a parallel beam of incident light at 45° incidence. The transparent sheet is placed in contact with a printed black and white sheet of reflectances r_w and r_b for the white and black portions, respectively. The further assumption is made that the greater the visual contrast between the parts of the transparent sheet over the white and the black backgrounds, the greater will be the transparency. The contrast is then expressed as the difference between the brightness sensations recorded by the observer. The expression for brightness sensation and the light energy received by the eye is given by Fechner's law of logarithmic brightness sensation response:

$$S = k \log E . \qquad (5)$$

Applying this relation to the transparent sheet, the formula for contrast is:

$$\text{Contrast} = S_w - S_b = k (\log E_w - \log E_b), \qquad (6)$$

where
S_w = brightness sensation from paper over white;
S_b = brightness sensation from paper over black;
E_w = energy received by the eye from paper over white;
E_b = energy received by the eye from paper over black;
k = proportionality constant.

Wicker then introduces the concept of image visibility as the ratio of the contrast between the white and black of the background for the transparent sheet in contact with the background to the contrast for the background alone. The image visibility then becomes

$$\text{Image Visibility} = \frac{S_w - S_b}{S'_w - S'_b} = I.V.$$

The prime notation refers to the brightness sensation of the background alone.

Wicker arrives at the following expression for image visibility in terms of measurable reflectances after considering the relative amounts of energy leaving the various portions of the sheet, including the infinite series of reflections between the transparent sheet and the opaque background:

$$I.V. = \frac{\log [KT^2R_w (1/1 - R_wR_a) + R_a] - \log R_a}{\log R_w - \log R_b} \cdot 100, \qquad (7)$$

where
$I.V.$ = per cent image visibility
T = fractional transmittance of the sheet
K = ratio between transmittances at 45° and 90° incidence
R_w = fractional reflectance of the white surface
R_a = fractional total reflectances of the sheet
R_b = fractional reflectance of the black surface
R_a = diffuse reflectance of the sheet

Note: This last equation and definition of terms are quoted from Wicker's thesis *(3)*, page 108.

From the foregoing discussion of image visibility, it can be seen that the logarithm of the contrast ratio would be proportional to the image visibility, since it is simply the numerator of the image visibility expression. However, due to the differences in the angles of illumination and reflection, the image visibility as calculated from the contrast ratio results are higher by a factor of 20 per cent than those calculated from (7). However, the order of the samples correlates closely for the two cases.

The next question under this section is the study of the definition of an image of the boundaries of the printed black areas on the white background as seen through a transparent sheet. To be sure, this question of definition of the image of a black and white boundary also enters in the judgment of transparency even when the transparent sheet is in contact with the printed page. However, the judgment of relative transparency as determined when the transparent sheet is in contact with the printed page slights the property which is most important in Webster's definition of "transparent".

Consider the printed page referred to above. The image of a sharp boundary is seen as sharp due to the sudden decrease in the brightness of the page as one changes his attention from the white area to the boundary. If a piece of glass 1 mm. thick is now placed over the page, again the image of the boundary is sharply defined. The reason for this is that the directions of the rays emerging from the glass plate are parallel to their respective incident directions. When scattering takes place along the path of rays through the transparent sheet, one must consider the regions of the scattering material as new sources of light, whose images will be superposed on the image of the background boundary. It is then seen that, since the scattering does occur for the glassine sheets, the variation of the scattered light with angle between the incident and scattered rays must be known in order to account for the diffuse appearance of the boundary after the light has passed through the transparent sheet.

TABLE I.—VARIATION OF THE INTENSITY TRANSMITTANCE WITHIN A SMALL ANGULAR RANGE AS A FUNCTION OF THE ANGLE BETWEEN THE TRANSMITTED BEAM AND THE PAPER SURFACE.

Angle in Degrees between Transmitted Beam and Paper Surface	Transmitted Intensity in Arbitrary Units		
	Sample 4	Sample 18	Sample 8
10.0	1.12	1.97	0.80
20.0	3.72	6.41	1.72
30.0	19.50	21.50	2.79
35.0	68.00	47.10	3.36
40.0	216.00	103.10	3.96
42.5	297.00	133.70	4.26
45.0	338.00	149.80	4.51
47.5	329.00	147.20	4.77
50.0	260.00	126.30	4.98
55.0	86.00	61.40	5.31
60.0	22.20	27.50	5.45
70.0	3.00	8.70	5.39
80.0	1.02	4.10	5.00
90.0	0.52	2.40	4.53

Note: Sample 4 is a sheet of high transparency. Sample 18 is a sheet of low transparency. Sample 8 is an uncalendered sheet of very low transparency.

Figures 1a, 1b, 1c and the data presented in Table I give variations of the scattered intensity with angle between the incident and the scattered beam. This data will be used to explain the fact that fairly sharp bound-

aries can be noticed, even for poor grades of glassines, when the sheets are in contact with the printed page, in addition to the rapid increase in the diffuseness of the boundaries as the distance between the transparent sheet and the background is increased.

Consider glassine paper number 4 (Fig. 1a) in contact with the printed page. The sharp boundary of the black and white separates areas of width, large, compared to the thickness of the sheet, so that only the energy coming from the white side of the boundary need be considered. Fix attention on an area of the black background about 1 mm. from the boundary. The brightness of this image is determined by the intensity of the beam coming from the white area of the background, the angles which the rays make with the direction of viewing the sheet, and the diffusely reflected light which is incident on the front surface. The direction of view is practically perpendicular to the paper. The thickness of the sheet is approximately 0.001 inch. Hence, when the sheet is in contact, the angles made with the normal to the sheet are practically 90°. The scattered intensity arises only from diffuse reflection, which is assumed constant. For a distance of ⅛ inch separation between the glassine and the background, approximately 5 per cent of the ligfit incident from the white background is scattered from the small area under consideration into the direction of view. For a separation of 1 inch, the scattered intensity becomes about 90 per cent of the directly transmitted radiation. This estimate is a very rough one, because multiple scattering and the relative solid angles subtended by the scattering volume have been neglected. The other factor which has been slighted is the decrease of the energy with approximately the inverse square of the distance between the sheet after the separation becomes about ¼ inch. However, this decrease in intensity is partly compensated by the logarithmic response describing relative contrast. It is to be noted that despite the approximations, the estimate is within a factor of two of agreeing with visual observation.

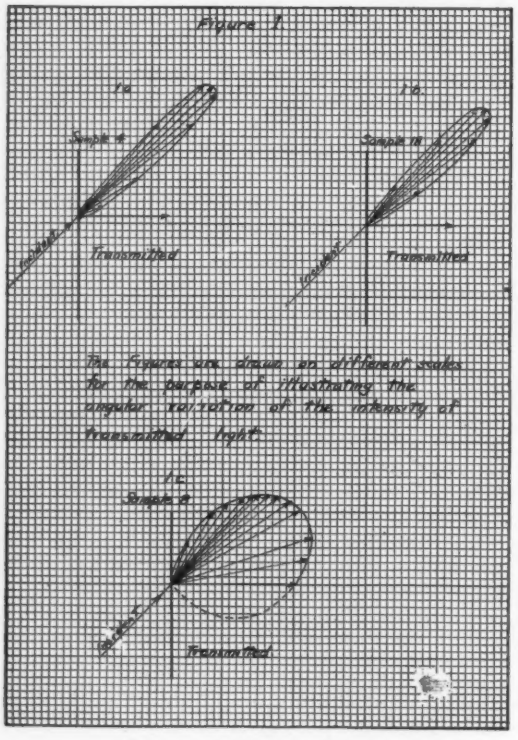

FIG. 1

From the examples cited in the last two paragraphs, it is seen that the necessary condition for good definition of an image seen through a transparent sheet is that the sheet have a high parallel transmittance. To be sure, in the actual case of visual observation the transmission of the sheet should show high transmission for angles within 1° of the direction of the ray connecting the eye with the point of the sheet being considered. Then, also, the transmission must fall rapidly to zero for angles greater than 1°. It would appear that the ideal way of experimentally measuring the transparency of the sheet would be an optical system analogous to that of the eye, in addition to having the sensitivity of the instrument similar to that of the eye. Results obtained by a research method of this type will be discussed later.

It is thus apparent that the measurement of parallel transmittance might be taken as an index of transparency for sheets in which the absorption is practically constant. It is readily seen that, for deeply colored glassines or colored glasses in which the absorption coefficient is not constant or negligible, the values of parallel transmittance would indicate that these samples are of low transparency.

Theoretical considerations suggest that the ratio of the parallel transmittance to the total transmittance might be taken as a measure of the transparency of a sheet after Webster's definition. The advantages and limitations of these quantities as measures of transparency will be considered in the section illustrating the correlation of different instrumental data.

The following factors prompted the design of an experimental instrument for the measurement of either parallel transmittance or transparency ratio (ratio of parallel transmittance to total transmittance):

1. The above discussed theoretical connection between parallel transmittance and transparency as defined by Webster.
2. The correlation between visual grading of tinted white commercial glassines and the values of parallel transmittance after Wicker's instrumental definition of parallel transmittance.
3. The lack of an instrument acceptable to the Glassine Association for the measurement of transparency.

The following points were considered in the design of the instrument:

1. Simplicity of optical and electrical recording systems.
2. The range of the instrument to be chosen so that glass has a parallel transmittance of 0.9 and a transparency ratio of unity. The scale to be so chosen that high quality glassines will give reproducibly different values for samples which are just perceptibly visually different, and the supercalendered sulphites to have values which are dependable, though low.
3. Minimum cost consistent with accurate meters.
4. Direct reading.
5. The geometry of the optical system to be accurately defined and reproducible from instrument to instrument.
6. Ease and accessibility of adjustments necessary for calibration.
7. Source of light to have an energy output constant within 0.2 per cent and approximate a point source.
8. The sample holder to permit of convenient mounting of sample and the continuous reading of a sheet across the web. The sample to be held flatly, in order to minimize the effects of cockle and wrinkle.
9. The area of the sample to be sufficiently large to minimize the number of readings necessary in quoting the transparency of the sheet. The shape of the area and of

the light recording surface to be symmetrical, in order to average out effects of machine and cross direction.

10. The photocell to possess the following characteristics:

a. The output current to be a linear function of the input light energy within 1 per cent over the range of light energies necessary for the requirement of point 2.

b. The photocell to have a spectral response comparable with the "visibility response" of the human eye.

c. The sensitivity of the photocell to be constant over the diaphragmed area of the photocell to within 5 per cent as measured with a circular test area of ¼ inch diameter.

11. The photocurrent measuring device to be a critically damped Weston microammeter, this requirement to be satisfied for the sake of accuracy and ruggedness.

12. The rheostats for controlling either the light intensity or the microammeter sensitivity to be of highest quality, that they might provide a continuously variable control of meter deflection comparable with the desired over all accuracy.

13. Calibrating standards to be developed if found necessary.

The experimental model which was built to satisfy these conditions is schematically drawn in Fig. 2. Fig. 3 illustrates the simple electrical system, as well as the schematic diagram of the optical system for the two steps in the measurement of parallel transmittance.

As is seen from Figs. 2 and 3, the instrument consists of a tungsten filament lamp, a simple 50 mm. focal length centered lens, a sample holder, a Weston Photronic cell ("visibility" sensitivity), and diaphragms. The source of energy for the lamp is a 6-volt lead cell storage battery. The lamp is in series with the battery and two General Radio rheostats, one of 6 ohms and the other of 25 ohms resistance. The photocell is in series with either a Leeds and Northrup portable galvanometer or a Weston model 440 microammeter. The 440 meter satisfies the condition of accuracy for minimum cost set forth above.

The base plate and diaphragms are made of ⅛ inch sheet brass and securely fastened with machine screws. The sample holder is constructed of two brass plates with a spring hinge at the bottom. Two photographic plates are cemented onto the brass plates and serve as the flat transparent surfaces for keeping the sample free from cockle and wrinkle. As can be seen from the diagram, the sample may be continuously drawn through the holder and readings taken at all positions.

The diaphragms are designed so that a circular sample area of one inch diameter is illuminated. The area of the diaphragm immediately before the photocell is equivalent in shape and area. Provision is made for increasing the distance between photocell and sample.

The reproducibility of the optical system depends only on the care taken in the machining of the diaphragms and the reproducibility of focus conditions.

Before considering the variations in the parallel transmittance readings produced by changes in each of the possible variables, the question as to what the instrument measures will be discussed. Parallel transmittance is the ratio of the photocurrent produced when the sample is placed in the beam to the photocurrent produced when no sample is present. The calculated expression for the parallel transmittance will now be derived so that the contributions of all the factors will be included. The optical system is so designed that the energy reaching the photocell is included within a cylinder 7.5 inches long having circular ends of 1 inch in diameter. The maximum scattering angle for a pencil of scattered light is 8°. The average scattering angle would have to be estimated from a measurement by a small test photo surface and will change with each sample. The beam which is incident on the sample is not completely parallel. The deviations from true parallelism are due to the finite angle subtended at the lens by the surface of the filament of the source and due to the spherical aberration of the lens. Another factor which varies from the ideal condition is the reflectance of the photocell surface. However, the over-all reflectance is approximately 10 per cent, the effect of which is of second order smallness and may be neglected. The sensitivity of the surface is a function of the angle of incidence, and consequently, the photocurrent will vary due to this factor.

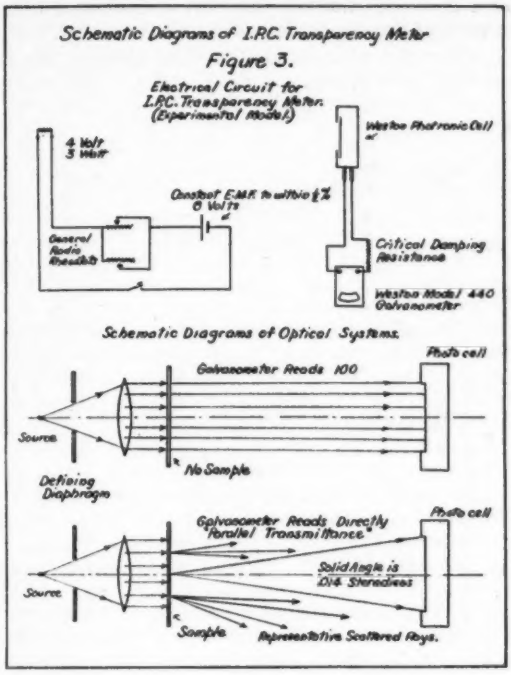

FIG. 3

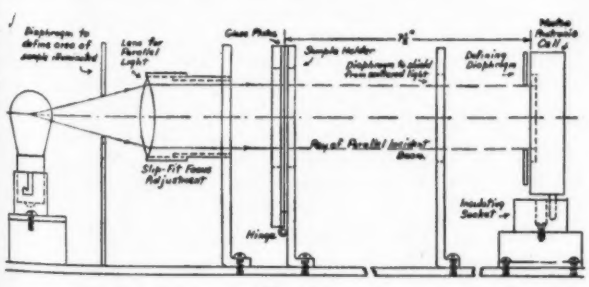

FIG. 2

Derivation of Equations Defining Parallel Transmittance and Transparency Ratio

Figure 4 is a schematic diagram showing the sample

DEFINITION OF TERMS USED IN DERIVATION

I_λ = Energy per unit area incident on sample in wave length range λ to $\lambda + d\lambda$.

$f(\phi,\omega,S_\lambda)$ = Fraction of the energy transmitted by the sheet between angles ϕ and $\phi + d\phi$ per unit solid angle per unit area of sample.

$S(\lambda)$ = Photocurrent output per unit energy between λ and $\lambda + d\lambda$ per unit area.

$A(\lambda,\phi)$ = Fraction of energy incident on the photocell surface which is absorbed.

r = Radius vector in plane of sample (r_1) or of photocell (r_2).

θ = Azimuth in plane of sample (θ_1) or of photocell (θ_2)

ϕ = Angle between scattered ray and the normal to the surface.

$dA_1 = r_1 dr_1 d\theta_1$ (element of area of sample)

$dA_2 = r_2 dr_2 d\theta_2$ (element of area of photocell)

surface and the photocell surface, and defines the quantities used in the derivation.

Consider the photocurrent arising due to the energy transmitted by dA_1 and absorbed by dA_2. The expression for this photocurrent, taking account of the various fractions above defined, is

$$\int_{\lambda_2}^{\lambda_1} I_\lambda dA_1 \cdot f(\phi,\mu\lambda,\ \ ) \cdot \frac{dA_2\cos\phi}{(d^2+l^2)} \cdot S(\lambda)A(\lambda,\phi)d\lambda, \qquad (8)$$

where

$$\text{Cos}\phi = d/[d^2 + r_1^2 + r_2^2 - 2r_1r_2\cos(\theta_2-\theta_1)]^{1/2}, \qquad (9)$$

and

$$l^2 = r_1^2 + r_2^2 - 2r_1r_2\cos(\theta_2-\theta_1). \qquad (10)$$

Hence, the total photocurrent will be expressed as the double integral over the area of the photocell and of the sample. This expression for total photocurrent is

$$i_p = \int_0^{r_1}\int_0^{r_2}\int_0^{2\pi}\int_0^{2\pi}\int_{\lambda_1}^{\lambda_2} I_\lambda f(\phi,\mu\lambda,S\lambda) \cdot \frac{\cos\phi}{(d^2+l^2)} \cdot S\omega A(\omega,\phi) r_1r_2dr_1dr_2d\theta_1d\theta_2d\lambda. \qquad (11)$$

The expression for the photocurrent for the case of no sample in the beam is

$$i_o = \int_0^{r_1}\int_0^{2\pi}\int_{\lambda_1}^{\lambda_2} g(\theta_1r_1) \cdot S\omega A(\omega,\phi)\ r_1dr_1d\theta_1d\lambda, \qquad (12)$$

where $g\ (\theta_1r_1)$ represents the fraction of the energy incident at the sample which strikes the photocell per unit area at (θ_1r_1). $g(\theta_1r_1)$ would be unity if the photocell surface were of uniform sensitivity.

The definition of parallel transmittance is then represented by the equation.

$$T_p = i_p / i_o, \qquad (13)$$

where the photocurrents i_p and i_o are defined by equations (11) and (12).

The transparency ratio, the ratio of the parallel transmittance to the total transmittance of the sample, is

$$T_r = \frac{i_p / i_o}{i_t / i_o} = i_p / i_t. \qquad (14)$$

The total transmittance of the sheet (i_t) is given by the equation

$$i_t = \int_0^{r_1}\int_0^{r_2}\int_0^{2\pi}\int_0^{2\pi}\int_{\lambda_1}^{\lambda_2} I_\lambda dA_1 f(\phi,\mu\lambda,s\lambda) \cdot \frac{dA_2\cos\phi}{(d_o^2+l_o^2)} \cdot S(\lambda)A(\lambda,\phi)d\lambda. \qquad (15)$$

The symbols ϕ_o, d_o, l_o refer to the case in which the sample is placed immediately over the photocell surface. The transparency ratio i_p/i_t is then measured by the ratio of equation (11) to (15).

These equations represent symbolically the contributions to the parallel transmittance and the transparency ratio of all the instrumental variables.

Hence, it is seen that the definition of parallel transmittance is an integral of five factors.

$$P_t = \int_{\lambda_1}^{\lambda_2} \text{light source and lens, sample, geometry, photocell, } d\lambda.$$

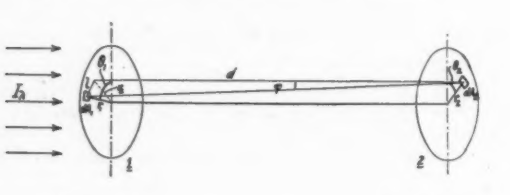

FIG. 4

The simplifications in these relations which arise for the actual case will be discussed in the section on correlation of instrumental measures.

The choice of the optical system in Fig. 2 was necessary because of the demand for simplicity, the area of the sample, and the reasonable range of values for the glassine papers. The choice of such an arbitrary measurement to be used for parallel transmittance, in contrast to either the measurement of the ideally defined parallel transmittance or total transmittance, is valid only when practicably usable results are obtained. It is to be emphasized strongly that this choice of measurement of parallel transmittance, although arbitrary, is well defined. Consequently, from now on, in speaking of parallel transmittance or total transmittance, those values as measured on this instrument will be implied. It is then appreciated that correlation may be expected with some other measurement of parallel transmittance, but accurate agreement would be only a happy accident.

The Changes in Parallel Transmittance with Instrumental Variables

1. THE PHOTOCELL. Three different photocells were tested for use in the instrument. These included the Westinghouse Photox, the Weston Standard Photronic, and the Weston Green-faced Photronic cell, with a spectral response analogous to that of the visibility response of the human eye. These cells were tried in the hope that it would be possible to use a high intensity light beam from a 32 or 50 c.p. headlight bulb, thereby permitting the use of a cheaper and more rugged meter than is the Weston model 440 microammeter. Parallel transmittances as measured by the use of each of the three cells gave smooth curves representing parallel transmittance on one cell as a function of the other. The range of total currents observed in these cases was from 200 microamperes down. The differences between the three cases were far greater than was to be expected by the difference in spectral sensitivity. Hence, calibration curves were obtained for the three photocells in addition to the standard Photronic used in conjunction with a Jena infra-red filter. The curves in Fig. 5 show the variation of galvanometer deflection with incident light energy. The inverse square law of intensities was used to determine the scale, which was proportional to the incident energy. The accurate direct proportion existing between output photocurrent and incident light energy is shown to hold accurately for the Photronic cell with the green filter for currents up to 200 microamperes. The safe upper limits for the assumption of linearity of response of the other cells follow:

Standard Photronic	50 microamperes
Photox	150 microamperes
Photronic + Jena	75 microamperes

It is seen from the curves that, for general use over large ranges of intensities, the Photronic cell with the green filter is the most reliable of this group. Of course, it is realized that the deviations from linearity of response are functions of the external resistances in series with the photocells. A low resistance galvanometer was used for the current measurement; so the cells are working to advantage. In view of this data, the Photronic cell with the green filter was chosen for use in the instrument. Similar cells were not available in order to check the generality of the linear response of this model of the Weston Photronic cell.

It is a gratifying fact that the spectral sensitivity of this green-faced Photronic cell is analagous to the visibility response of the human eye. As was seen from the

defining equation for parallel transmittance, the spectral sensitivity of the cells performs a weighted average of the energy over the visible spectrum. The changes in the parallel transmittance caused by variations in spectral sensitivity of the photocells is small for the tinted white glassine papers used in this study. The two predominating shades are the green and brown tints. The percentage of total absorption in these sheets varies from 3 to 7 per cent. Hence, the contribution to the change in parallel transmittance due to this variable is small. However, a constant spectral sensitivity must be demanded for cells to be used in commercial instruments, if results reproducible to within 1 per cent of full scale are to be expected for highly colored glassine sheets.

The variation of parallel transmittance caused by surface variations of sensitivity may contribute differences of the order of one or two per cent for the case of the highly transparent glassines. This is true because of sensible variations in intensity incident on the cell for the sample both in and out of the beam. The permanence of the spectral sensitivity is demanded for the reproducibility of the parallel transmittance scale over a long period of time. No definite data have been accumulated in regard to this point.

This blocking layer type of cell is, in general, subject to fatigue effects. From the point of view of accuracy of measurement, long period fatigue may be compensated by changes either in light intensity or galvanometer sensitivity. However, the short period fatigue, which is evidenced in the 100 per cent reading after a sample of low parallel transmittance has been measured, may contribute fluctuations of one or two per cent if the time of one-half minute is not allowed between readings.

2. Filament Voltage. The variations of parallel transmittance due to color temperature changes and voltage fluctuations are the two variables to be ascribed to variations in filament voltage. An increase in lamp voltage corresponds to an increase in color temperature and an increase in the relative weights given to the blue transmitted light. However, for a tinted white glassine paper these changes may be expected to be small. Data given in Table II show the parallel transmittance for the lamp run at both six and four volts. It is to be seen that the average difference between the parellel transmittance as determined by an average of four measurements changes by one per cent of full scale. The fluctuations, however, are random and appear due to sample variations. This fact, in addition to answering definitely the color temperature possibility, permits a variation of full scale reading by a change in lamp voltage. It was decided to compensate for zero drift and fatigue effects by a rheostat control in series with the lamp on the first instrument. In the last model of the instrument, a fixed resistor is in series with the lamp, and the desired control of the microammeter is performed by rheostats. The present design uses a lead storage battery as a source of voltage. This choice was made in contrast to a voltage regulating device to be supplied from the a.c. mains. At the color temperature actually used, the change in output energy is proportional to the fourth power of the voltage change. Hence, it is seen that a source of voltage constant to less than 0.3 per cent is necessary to maintain the light intensity constant to within 1 per cent. These energy changes of 1 per cent become important when desiring to maintain reproduci-

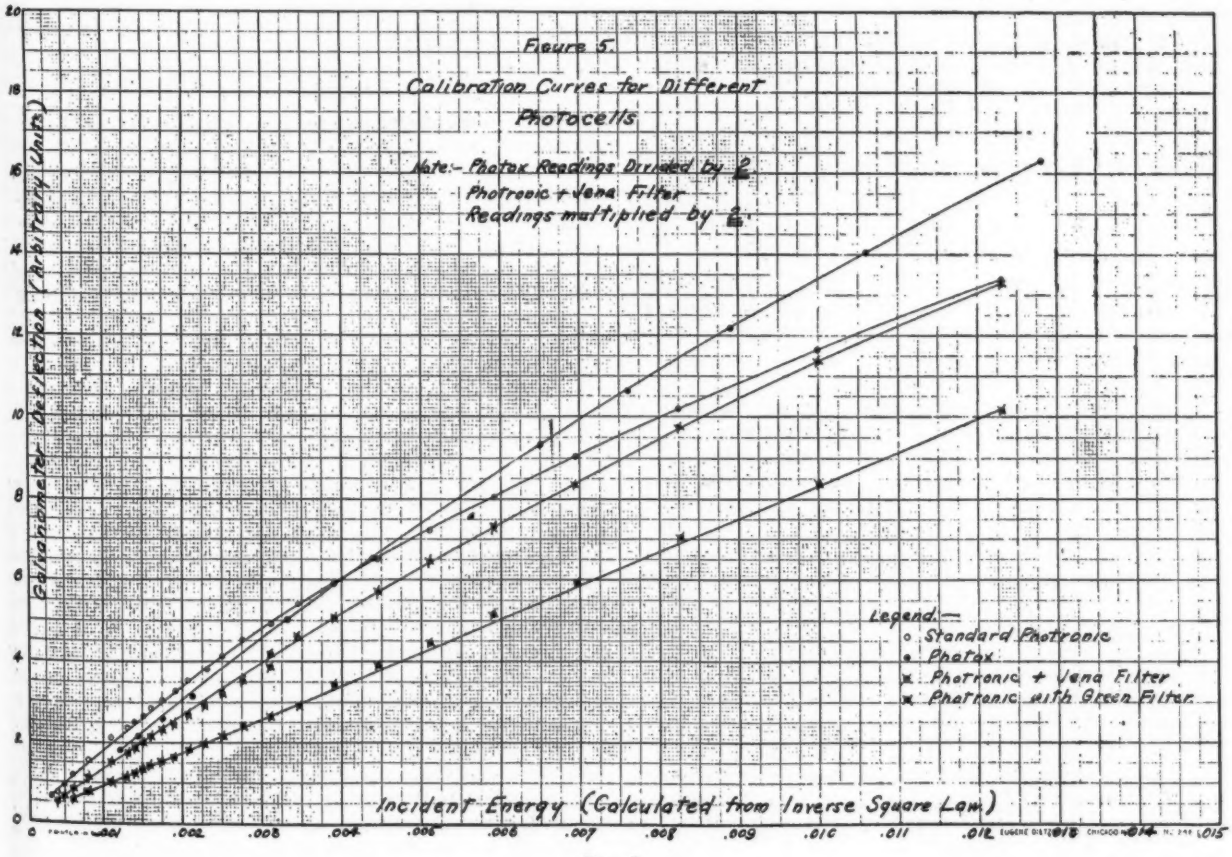
Figure 5.
Calibration Curves for Different Photocells
Note:- Photox Readings Divided by 2.
Photronic + Vena Filter Readings multiplied by 2.
Galvanometer Deflection (Arbitrary Units)
Incident Energy (Calculated from Inverse Square Law)
Legend.—
Standard Photronic
Photox
Photronic + Vena Filter
Photronic with Green Filter

Fig. 5

TABLE II.—PARALLEL TRANSMITTANCE AS MEASURED ON THE EXPERIMENTAL INSTRUMENT FOR THE SAME SOURCE RUN AT 6 VOLTS AND AT 4 VOLTS. THE QUOTED VALUES ARE AVERAGES OF FOUR READINGS.

Sample No.	Per cent Parallel Transmittance	
	Light Source at 6 volts	Light Source at 4 volts
1	91.0	91.0
2	89.5	90.6
3	48.0	49.0
4	49.0	47.2
5	47.0	47.1
6	33.6	33.5
7	33.6	33.8
8	6.05	5.9
9	41.5	40.7
10	38.3	39.0
11	21.4	22.6
12	38.0	37.5
13	44.2	43.7
14	41.5	40.3
15	35.2	34.5
16	(No Data)	
17	25.3	23.9
18	21.5	20.4
19	46.7	46.0
20	40.0	39.2
21	11.5	11.7
22	26.6	25.5
23	16.4	17.6
24	23.6	25.8
25	33.7	34.8

bility of measurement on the same area of the sample to within 0.5 per cent.

3. Focus. The changes possible in the focusing of the filament emphasize themselves in the divergence or convergence of the beam from the best approximation to a parallel beam. The finite size of the filament gives rise to a beam which is only approximately parallel. An image distance of 20 feet is chosen for the best approximation to parallelism. The parallel transmittance increases as the lens is adjusted to produce either a more divergent or convergent beam than that for the 20 foot focal distance. The data representing these changes are given in Table III. Here the values of parallel transmittance are quoted for 3 mm. changes in the distance between filament and lens. Variations of 5 per cent of full scale are indicated. The advantage of this value of minimum parallel transmittance for the beam most nearly approximating the parallel conditions provides a critical adjustment valuable in calibration. At the same time, it does not reduce the difficulty that more care has to be taken in calibrating the instrument than might otherwise be required. The increase in parallel transmittance for the divergent beam is caused by the fact that less energy is incident on the photo-cell surface for the 100 per cent

TABLE III.—VARIATIONS OF PARALLEL TRANSMITTANCE CAUSED BY DIFFERENT FOCAL ADJUSTMENTS OF THE CONDENSING LENS. THE QUOTED RESULTS ARE AVERAGES OF FOUR READINGS.

Sample No.	"Diverging" Incident Beam	"Parallel" Incident Beam	"Converging" Incident Beam
1	91.7	91.0	92.0
2	91.2	90.6	92.0
3	53.2	49.0	54.0
4	53.2	47.2	54.3
5	52.0	47.1	54.3
6	38.1	33.5	36.7
7	38.2	33.8	36.9
8	73.5	5.9	6.0
9	45.8	40.7	46.0
10	43.0	39.0	42.0
11	25.0	22.6	22.4
12	42.5	37.5	42.0
13	48.5	43.7	48.7
14	48.3	40.3	46.3
15	39.4	34.5	38.6
16		(No Data)	
17	30.8	23.9	28.3
18	24.3	20.4	22.9
19	51.5	46.0	51.3
20	43.0	39.2	43.3
21	13.8	11.7	12.1
22	30.0	25.5	27.9
23	19.2	17.6	17.2
24	27.0	25.8	25.5
25	38.4	34.8	37.2

Note: "Parallel" incident beam indicates that filament is focused at a distance of 20 feet.
"Diverging" incident beam indicates that the lens has been moved 3 mm. toward the source from its position for "parallel" incidence.
"Converging" incident beam indicates that the lens has been moved 3 mm. from the source from its position for "parallel" incidence.

TABLE IV.—TRANSMITTANCE AS DETERMINED BY REMOVAL OF THE LENS VERSUS PARALLEL TRANSMITTANCE.
The geometry of the instrument has remained constant except for the removal of the lens. The data set the upper limit for changes in parallel transmittance with focus adjustments.

Sample No.	Lens Removed from System. Transmittance in Per Cent	Parallel Incident Beam Per Cent Parallel Transmittance
1	92.6	91.0
2	91.8	90.6
3	72.6	49.0
4	75.2	47.2
5	71.6	47.1
6	63.4	33.5
7	64.3	33.8
8	20.1	5.9
9	68.7	40.7
10	67.1	39.0
11	50.5	22.6
12	67.3	37.5
13	70.0	43.7
14	66.0	40.3
15	60.6	34.5
16	(No Data)	
17	52.3	23.9
18	46.2	20.4
19	70.4	46.0
20	66.8	39.2
21	33.5	11.7
22	52.7	25.5
23	38.5	17.6
24	48.3	25.8
25	58.7	34.8

setting than is incident on the sample. Consequently, the scattered light shows a corresponding increase. The increase in parallel transmittance for the case of the converging beam must be explained by the fact that a larger range of scattering angles is included for the transmitted energy.

To define the upper limit for the change in parallel transmittance with divergence of beam, readings were taken on the sample with the lens removed. These values are given in Table IV. Large fluctuations are observed between this case and the case of parallel incident light. The second fact observed is that the range of the values from highest to lowest transparency corresponds approximately to 3.5 to 1, as contrasted to the corresponding ratio of 6 to 1 for the parallel incident light.

(To be continued)

Britain Standardizes Sizes

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 7, 1937—With the cooperation of representatives from several Colonial government departments and from forty-four scientific and industrial organizations, a committee under the authority of the General Council of the British Standards Institution has issued a list of British standard sizes for paper affecting writings, printings, wrappings, casings and trimmed boards. All this according to a recent report from Assistant Commercial Attache James Somerville at London.

The list is based upon a previous one which was prepared and given a wide circulation for a trial period of one year. As a result of comments based on this earlier circulation, the committee ruled out any proposal which included more than one size for one name, as being contrary to the interests of the industry.

The present issue, "covers the sizes used in this country and the overseas Dominions, with the exception of India." With regard to Canada, it is noted, however, that there is a leaning in that Dominion towards the sizes common in the United States.

Since the sizes used in India differ somewhat from those more common in the United Kingdom and certain of the Dominions, the Indian authorities have been invited to consider the matter further, and the hope is expressed that within two years agreement may be obtained to the recognition of the list as a British Empire standard. In the meantime it is recommended that Australia, South Africa, and New Zealand should issue the list as their own local standard during these two years.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING JULY 3, 1937

SUMMARY

Cigarette paper ..... 606 cs.
Wall paper ..... 10 bxs.
Wall board ..... 458 bdls.
Paper hangings ..... 5 bls., 3 cs.
Newsprint ..... 9,094 rolls
Printing paper ..... 45 casks, 111 cs.
Wrapping paper ..... 10,111 rolls, 26 bls., 44 cs.
Filter paper ..... 25 pkgs., 22 cs.
Drawing paper ..... 13 cs.
Surface coated paper ..... 199 cs.
Metal coated paper ..... 24 cs.
Decalcomania paper ..... 22 cs. (duplex)
Decalcomanias ..... 17 cs.
Transfer pictures ..... 5 cs.
Colored paper ..... 11 cs.
Pith paper ..... 10 cs.
Gummed paper ..... 11 cs.
Card board ..... 19 cs.
Paper tubes ..... 220 pkgs.
Straw boards ..... 240 rolls
Paper board ..... 47 bls.
Envelopes ..... 6 cs.
Miscellaneous paper .....1,110 rolls, 348 bls., 91 cs.

CIGARETTE PAPER

Champagne Paper Corp., *Lafayette,* Havre, 240 cs.
De Mauduit Paper Corp., *Normandie,* Havre, 2 cs.
American Tobacco Co., *Normandie,* Havre, 5 cs.
H. H. Strauss, *Normandie,* Havre, 208 cs.
Brandesten Freres, *Normandie,* Havre, 81 cs.
Liggett & Myers Tobacco Co., *Champlain,* Havre, 24 cs.

WALL PAPER

S. K. Lonegren, *Kungsholm,* Gothenburg, 10 bxs.

WALL BOARD

——, *Sydic,* Sundsvall, 458 bdls.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Farmer,* London, 3 cs., 5 bls.

NEWSPRINT

Jay Madden Corp., *Hamburg,* Hamburg, 622 rolls.
International Paper Co., *G.T.D.,* Gatineau, 303 rolls.
International Paper Co., *Arizpa,* Dalhousie, 3437 rolls.
International Paper Sales Co., *Arispa,* Dalhousie, 646 rolls.
——, *Bergensfjord,* Oslo, 287 rolls.
N. Y. Evening Journal, *Markland,* Liverpool, N. S., 410 rolls.
N. Y. Tribune, Inc., *Markland,* Liverpool, N. S., 1696 rolls
World Telegram, *Markland,* Liverpool, N. S., 460 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 462 rolls.
Westchester Newspapers, *Markland,* Liverpool, 45 rolls.
Parsons & Whittemore, Inc., *Markland,* Liverpool, N. S., 123 rolls.
Perkins Goodwin & Co., *Hansa,* Hamburg, 304 rolls.
H. G. Craig Co., *Kermic,* Donnacona, 299 rolls.

PRINTING PAPER

L. A. Consmiller, *Bremen,* Bremen, 17 cs.
T. N. Fairbanks, *American Farmer,* London, 1 cs.
Oxford University Press, *Laconia,* Liverpool, 16 cs.
R. J. Saunders, *Aquitania,* Southampton, 3 cs.
Dingelstedt & Co., *Hansa,* Hamburg, 74 cs., 45 casks.

WRAPPING PAPER

F. C. Strype, *Black Tern,* Antwerp, 16 cs., 1 roll.
Perkins Goodwin & Co., *Hamburg,* Hamburg, 371 rolls.
Guaranty Trust Co., *Hamburg,* Hamburg, 1097 rolls.
Keller Dorian Paper Co., *Pr. Pierce,* Marseilles, 9 cs.
Guaranty Trust Co., *Kungsholm,* Gothenburg, 26 bls., 2585 rolls.
——, *Kungsholm,* Gothenburg, 3330 rolls.
E. Dietzgen & Co., *Hansa,* Hamburg, 19 cs.
——, *Hansa,* Hamburg, 128 rolls.
Jay Madden Corp., *Pr. Roosevelt,* Hamburg, 2599 rolls.

FILTER PAPER

E. H. Sargent & Co., *Kungsholm,* Gothenburg, 10 cs.
H. Reeve Angel & Co., Inc., *American Farmer,* London, 12 cs.
H. Reeve Angel & Co., Inc., *Aquitania,* Southampton, 25 pkgs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., *American Farmer,* London, 2 cs.
Geo. Haas, *American Farmer,* London, 6 cs.
Winsor Newton, Inc., *American Farmer,* London, 5 cs.

SURFACE COATED PAPER

L. A. Consmiller, *Bremen,* Bremen, 1 cs.
Gevaert Co. of America, *Henri Jaspar,* Antwerp, 198 cs.

METAL COATED PAPER

K. Pauli Co., *Hansa,* Hamburg, 24 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Laconia,* Liverpool, 22 cs. (duplex).

DECALCOMANIAS

Sellers Transportation Co., *Bremen,* Bremen, 17 cs.

TRANSFER PICTURES

Rohner Gehrig & Co., *Bremen,* Bremen, 5 cs.

COLORED PAPER

J. W. Hampton Jr. & Co., *Black Tern,* Antwerp, 3 cs.
International F'd'g Co., *Hamburg,* Hamburg, 8 cs.

PITH PAPER

Mitsui & Co., Ltd., *Nako Maru,* Keelung, 10 cs.

GUMMED PAPER

G. Gennert, *Hansa,* Hamburg, 6 cs.
A. L. Salomon Co., *Pr. Roosevelt,* Bremen, 4 cs.
E. B. Baehr & Sons, *Pr. Roosevelt,* Bremen, 1 cs.

CARD BOARD

——, *Henri Jaspar,* Antwerp, 19 cs.

PAPER TUBES

——, *Hansa,* Hamburg, 220 pkgs.

STRAW BOARDS

——, *Statendam,* Rotterdam, 68 rolls.
——, *Black Eagle,* Rotterdam, 172 rolls.

PAPER BOARD

Miller Paper Co., *Kungsholm,* Gothenburg, 47 bls.

ENVELOPES

——, *Hansa,* Hamburg, 6 cs.

MISCELLANEOUS PAPER

Steffens Jones Co., *Nako Maru,* Kobe, 4 cs.
——, *Nako Maru,* Kobe, 10 cs.
Japan Paper Co., *Pr. Lincoln,* Kobe, 36 cs.
Coty Processing Co., *Normandie,* Havre, 4 cs.
E. W. C. Toepfer, *Bremen,* Bremen, 1 cs.
A. Johnson & Co., *Kungsholm,* Gothenburg, 34 bls., 116 rolls.
——, *Kungsholm,* Gothenburg, 191 rolls, 290 bls.
——, *Bergensfjord,* Oslo, 680 rolls, 24 bls.
The Borregaard Co., Inc., *Gripsholm,* Gothenburg, 92 rolls.
Keuffel & Esser Co., *Hansa,* Hamburg, 31 rolls, 36 cs.

RAGS, BAGGINGS, ETC.

Irving Trust Co., *Black Tern,* Antwerp, 60 bls. rags.
Van Oppen & Co., *Black Tern,* Antwerp, 164 bls. rags, 44 bls. paper stock.
Castle & Overton, Inc., *Culberson,* Buenos Ayres, 380 bls. rags.

Herman Pack Co., *Statendam,* Rotterdam, 40 bls. bagging.
Royal Manfg. Co., *Kiyokawa Maru,* Kobe, 50 bls. cotton waste.
O. Smith & Sons Co., *Kiyokawa Maru,* Kobe, 100 bls. cotton waste.
O. Smith & Sons Co., *Kiyokawa Maru,* Shanghai, 50 bls. cotton waste.
Michigan Felt Works, *Kiyokawa Maru,* Shanghai, 55 bls. cotton waste.
Linter Supply Co., *Kiyokawa Maru,* Shanghai, 50 bls. cotton waste.
Castle & Overton, Inc., *Pr. Pierce,* Bombay, 155 bls. pickers.
———, *American Importer,* Manchester, 84 bls. bagging, 105 bls. paper stock, 233 bls. cotton waste.
Royal Manfg. Co., *American Importer,* Manchester, 91 bls. cotton waste.
———, *American Farmer,* London, 54 bls. paper stock, 66 bls. old strings.
Banco Coml. Italiane Trust Co., *American Farmer,* London, 83 bls. old cordage.
Manufacturers Trust Co., *Henri Jaspar,* Antwerp, 70 bls. rags.
Brandwein Mazur Co., *Pipestone County,* Dunkirk, 65 bls. cotton waste.
Irving Trust Co., *Pipestone County,* Havre, 71 bls. old strings.
J. F. Keene, *Pipestone County,* Havre, 55 bls. bagging.
E. J. Keller Co., Inc., *Pipestone County,* ———, 47 bls. new cuttings.
Castle & Overton, Inc., *Black Eagle,* Rotterdam, 302 bls. bagging.
———, *Laconia,* Liverpool, 25 bls. rags.
———, *Gloucester City,* Bristol, 72 bls. rags.
W. Steck & Co., *Banaderos,* London, 81 bls. old strings.
———, *Georgic,* London, 33 bls. rags.
———, *Pr. Roosevelt,* Hamburg, 73 bls. rags, 16 bls. jute cuttings.
J. Levy & Sons, Oriente, Havana, 11 bls. rags.

GLUE STOCK, ETC.

Castle & Overton, Inc., *Culberson,* Buenos Ayres, 238 bls. glue stock.
Darmstadt Scott & Courtney, Scanstates, *Gdynia,* 115 bls. glue stock.
American Express Co., *American Importer,* Liverpool, 1200 bags hide cuttings.

OLD ROPE

———, *Examiner,* Marseilles, 40 coils.
Brown Bros. Harriman & Co., *Kungsholm,* Gothenburg, 48 coils.
Brown Bros. Harriman & Co., *American Farmer,* London, 80 coils.
Banco Coml. Italiane Trust Co., *American Farmer,* London, 193 coils.
Brown Bros. Harriman & Co., *Gloucester City,* Bristol, 235 coils.
Chase National Bank, *Gloucester City,* Bristol, 226 coils.
Banco Coml. Italiane Trust Co., *Banaderos,* London, 49 bls.
———, *Pr. Roosevelt,* Hamburg, 65 bls.

WOOD PULP

Price & Pierce, Ltd., *Ivar,* Orviken, 3000 bls. unbleached sulphite, 500 tons.
Pagel Horton & Co., Inc., *Ivar,* Sikea, 9750 bls. sulphite.
Johaneson Wales & Sparre, Inc., *Hamburg,* Hamburg, 1016 bls. wood pulp, 203 tons.
Perkins Goodwin & Co., *Kungsholm,* Gothenburg, 223 bls. sulphate.
M. Sone, *Kungsholm,* Gothenburg, 254 bls. wood pulp.
E. M. Sergeant Pulp & Chemical Co., Inc., *Bergensfjord,* Nygaard, 600 bls. chemical pulp.
J. Andersen & Co., *Bergensfjord,* Oslo, 2500 bls. sulphite.
Castle & Overton, Inc., *Hansa,* Hamburg, 125 bls. wood pulp, 25 tons.
———, *Gertrud,* Stugsund, 2600 bls. sulphite, 515 tons.
———, *Gertrud,* Stugsund, 2250 bls. sulphate, 450 tons.
———, *Gertrud,* Hernosand, 7500 bls. sulphate, 4800 bls. sulphite.
Mead Sales Co., Inc., *Gertrud,* Sundsvall, 210 bls. chemical pulp, 42 tons; 310 bls. sulphite, 62 tons.
Johaneson Wales & Sparre, Inc., *Gertrud,* Sundsvall, 200 bls. chemical pulp, 40 tons; 2775 bls. sulphite, 545 tons; 120 bls. kraft knotter pulp, 20 tons; 150 bls. kraft sulphate, 25 tons.
Bulkley Dunton Pulp Co., Inc., *Gertrud,* ———, 3000 bls. chemical pulp, 600 tons; 1800 bls. sulphite, 300 tons; 1200 bls. sulphate, 200 tons.
———, *Karpfanger,* Sandarne, 250 bls. sulphate, 50 tons.
Bulkley Dunton Pulp Co., Inc., *Karpfanger,* ———, 1000 bls. sulphite, 200 tons.
Johaneson Wales & Sparre, Inc., *Karpfanger,* Sundsvall, 875 bls. sulphite, 175 tons.
Johaneson Wales & Sparre, Inc., *Karpfanger,* Munksund, 400 bls. kraft sulphate, 57 tons.
Johaneson Wales & Sparre, Inc., *Karpfanger,* Obbola, 2870 bls. sulphate, 410 tons.
Gottesman & Co., Inc., *Sydic,* Gefle, 1000 bls. sulphite.
Pagel Horton & Co., Inc., *Sydic,* Gefle, 750 bls. sulphite, 1085 bls. sulphate.
Stora Kopparberg Corp., *Sydic,* Gefle, 125 bls. sulphite, 1060 bls. dry pulp.
Tradesmans Natl. Bank Trust Co., *Sydic,* Norrsundet, 3275 bls. sulphate.
Perkins Goodwin & Co., *Sydic,* Sundsvall, 750 bls. sulphate, 810 bls. sulphite.
Gottesman & Co., Inc., *Sydic,* Sundsvall, 2850 bls. sulphite.
———, *Black Eagle,* Rotterdam, 270 bls. wood pulp, 54 tons.
Bank of The Manhattan Co., *Belvedere,* Trieste, 943 bls. wood pulp.
Bankers Trust Co., *Belvedere,* Sebenik, 5200 bls. sulphite.
Lagerloef Trading Co., *City of Fairbury,* Wiborg, 3484 bls. sulphite, 697 tons; 850 bls. sulphate, 146 tons; 1375 bls. mechanical ground pulp, 275 tons.
Lagerloef Trading Co., *City of Fairbury,* Kotka, 1312 bls. sulphite, 221 tons.
Jay Madden Corp., *City of Fairbury,* Kotka 747 rolls newsprint, 11 bbls. paper; 632 rolls, 69 bls. wood pulp boards, 285 tons.
Lagerloef Trading Co., *City of Fairbury,* Kotka, 780 bls. mechanical ground pulp, 156 tons.

WOOD PULP BOARDS

H. Fuchs & Son, *Kungsholm,* Gothenburg, 109 crates.
Fibre Case & Novelty Co., *Kungsholm,* Gothenburg, 22 bls.
Salwen Paper Co., *Grisholm,* Gothenburg, 33 bls.

NEWARK IMPORTS

WEEK ENDING JULY 3, 1937

H. G. Craig Co., *Newscarrier,* Donnacona, 326 rolls newsprint.
H. G. Craig Co., *Donpaco,* Donnacona, 317 rolls newsprint.

ALBANY IMPORTS

WEEK ENDING JULY 3, 1937

Brown Bros. Harriman & Co., *Ivar,* Kopmanholman, 2694 bls. chemical pulp.
Price & Pierce, Ltd., *Ivar,* Orviken, 2400 bls. unbleached sulphite, 400 tons.
Pagel Horton & Co., Inc., *Sydic,* Gefle, 10250 bls. sulphite; 1875 bls. sulphate.
———, *Sydic,* Gefle, 1500 bls. sulphite.
Gottesman & Co., Inc., *Sydic,* Gefle, 1500 bls. sulphite.
Gottesman & Co., Inc., *Sydic,* Ronnebyredd, 2900 bls. wood pulp.
Tradesmans National Bank Trust Co., *Sydic,* Norrsundet, 3250 bls. sulphate.
Perkins Goodwin & Co., *Sydic,* Sundsvall, 450 bls. sulphite.
Gottesman & Co., Inc., *Sydic,* Sundsvall, 4050 bls. sulphite.
———, *Sydic,* Sundsvall, 1275 bdls. wall board.
Perkins Goodwin & Co., *Karpfanger,* Stugsund, 450 bls. sulphite, 90 tons.
Johaneson Wales & Sparre, Inc., *Karpfanger,* Sundsvall, 3330 bls. sulphite, 630 tons; 1000 bls. chemical pulp, 200 tons; 750 bls. sulphate, 125 tons.
Atterbury Bros., Inc., *Karpfanger,* Sundsvall, 282 bls. dry pulp, 47 tons.
Perkins Goodwin & Co., *Karpfanger,* Sundsvall, 1650 bls. sulphate, 275 tons.
Bulkley Dunton Pulp Co., Inc., *Karpfanger,* ———, 1000 bls. sulphite, 200 tons.
Johaneson Wales & Sparre, Inc., *Karpfanger,* Obbola, 350 bls. sulphate, 50 tons.
———, *Karpfanger,* Hernosand, 3000 bls. sulphate, 500 tons.
Perkins Goodwin & Co., *Karpfanger,* Munksund, 3000 bls. kraft sulphate, 500 tons.
———, *Karpfanger,* Munksund, 2925 bls. sulphate, 585 tons.

PORTLAND IMPORTS

WEEK ENDING JULY 3, 1937

Price & Pierce, Ltd., *Hjelmaren,* ———, 2724 bls. unbleached sulphite; 2520 bls. unbleached sulphate.

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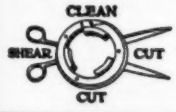

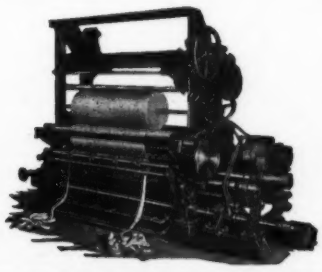

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New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, July 7, 1937.

The paper industry was fairly active last week, with a seasonal amount of buying. Prices, as a rule, are holding firm, with the trade generally confident. The contract movement continues normal.

The broadening newsprint demand was sustained, with mills busy on current orders.

Buying in the fine paper market is proceeding in moderate volume. The call for covers, bonds and ledgers is well sustained. The wrapping paper continues strong, with mills exceedingly busy. Box board is steady. Specialties are selling in fair volume. Manufacturers are finding it difficult to obtain pulp. Bleached sulphite pulp is extremely strong.

Chemical Pulp

Buyers of chemical pulp appear to have adopted a waiting attitude concerning purchases of imported grades, of which very little pulp remains available for this year, but some sales have been reported for 1938, both at fixed prices and in connection with the conversion of existing low-priced contracts for 1937. The demand for domestic grades continues brisk and prices for the third quarter are somewhat higher than during the second quarter of the year.

Mechanical Pulp

No new feature is reported in the mechanical pulp market, which continues on about the same basis as during the last two weeks, both in regard to prices and demand.

Old Rope and Bagging

The position of the old rope market is little changed. Paper mill demand for domestic and foreign old manila rope is about regular, but small mixed rope is moving slowly. The bagging market also is moving regularly. Demand for scrap and gunny bagging is about normal for the season.

Rags

The domestic rag market is quiet. The demand for old rags has fallen off slightly and with the exception of old whites is rather irregular. There is a better demand for roofing grades. While the prices have not advanced materially, the market is very active.

Waste Paper

The market for the better grades of paper stock continues about the same. The lower grades show a further decline over last week, the lowest reached in some time, but there is no indication that there will be any further drop.

Twine

Demand for twine is generally fair, with the future reasonably promising. The situation is approaching a good basis, it is intimated in the trade. At the present time, prices of cotton twine are not very stable, with dealers making reductions commensurate with the decline in raw cotton.

Honors Old Employees

As a mark of appreciation for long and loyal service 144 men were presented 25-year service pins by Farrel-Birmingham Company, well-known equipment makers of Ansonia, Conn., at a banquet on June 17, held in honor of employees who had served the company for 25 years or more.

Seated at the head table with the toastmaster and president of the company, were veterans who have worked for Farrel-Birmingham for 50 years. Of the men present, 100 had over 30 years' service to their credit and 37 had over 40 years.

Of the 114 present employees who received service pins, 44 had been with the company from 25 to 29 years; 23 from 30 to 34 years; 29 from 35 to 39 years; 10 from 40 to 44 years; two from 45 to 49 years; and six for 50 years or more.

In addition to these 114 men still in active service, Farrel-Birmingham has 30 retired employees with exceptionally long service records. Of these, 5 served from 30 to 34 years; 6 from 35 to 39 years; 9 from 40 to 44 years; 7 from 45 to 49 years; and 3 were with the company for 50 years or longer.

Toastmaster at the banquet was Nelson W. Pickering, president of Farrel-Birmingham. With him and the 50-year veterans sat Messrs. Charles F. Bliss, former president; Franklin Farrel, Jr., chairman of the board; and James W. Hook, president of the Geometric Tool Company and head of the New England Council, who delivered the principal address of the evening. In welcoming the guests, Mr. Pickering recalled that the number of Farrel-Birmingham employees 25 years ago was 800, of whom nearly 18 per cent were present; and of the company's 500 employees in 1900 10 per cent were in attendance. Declaring his pride in this long service record, Mr. Pickering attributed Farrel-Birmingham's success to the loyalty of its veteran workers and affirmed that this loyalty was mutual.

In his address, Mr. Hook eloquently reviewed the revolutionary changes in industry and methods of living that have taken place during the careers of the company's 25-year workers, and traced significant events from the presidency of Rutherford B. Hayes down through the Spanish-American and World Wars to the present day. Amid all these surprising changes, Mr. Hook declared, one thing at least has remained unchanged—the steadfastness and loyalty of Farrel-Birmingham's veteran employees.

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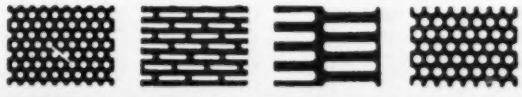
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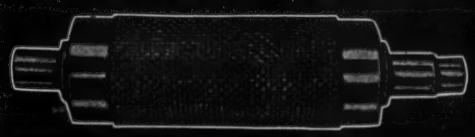
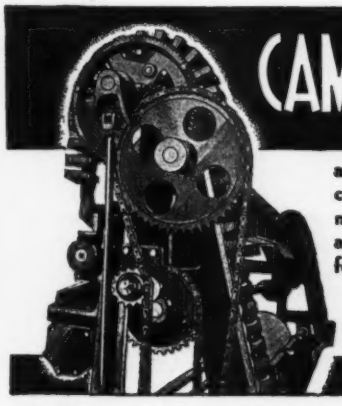
READY TO RUN
the moment driven and keyed. Write at once for circular "G" and instruction sheets free
THE N. P. BOWSHER CO
South Bend, Ind.
Established 1882

EMBOSSING ROLLERS

ROEHLEN ENGRAVING WORKS INC.
324 ST. PAUL ST.
ROCHESTER, N. Y.

CAMACHINES

are built as winders in connection with the paper machine or super calender and as rewinders and slitters for finishing room service
CAMERON MACHINE COMPANY
61 Poplar St., Brooklyn, N. Y.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, July 7, 1937.

BLANC FIXE—Prices in the blanc fixe market are generally holding to formerly quoted levels. The pulp is quoted at from $42.50 to $45 per ton in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Conditions in the bleaching powder market are improving slightly. The contract movement is normal and prices are generally maintained at former levels. Bleaching powder is offered at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The casein market rules fairly steady. Domestic standard ground casein is now quoted at from 13 to 14 cents per pound; while domestic finely ground casein is selling at from 13½ to 14½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA—Trading in the local caustic soda market is fairly satisfactory. Contract shipments are normal. Solid caustic soda is quoted at from $2.55 to $2.60; while the flake and ground are selling at from $2.85 to $3 per 100 pounds, in drums, at works.

CHINA CLAY—The china clay market is experiencing a strong undertone. Contract shipments are moving freely. Imported china clay is quoted at from $15 to $21 per ton, ship side; while domestic paper making clay is selling at from $6.50 to $12 per ton, at works.

CHLORINE—Business in the chlorine market is holding up and the contract movement is about normal. Prices are generally maintained at formerly quoted levels. Chlorine is quoted at from $2.15 to $2.25 per 100 pounds, in tank cars at works.

ROSIN—The rosin market shows little change from last week. Paper making gum rosin is quoted at $7.95 and wood rosin at $8.20 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $3.68 per 100 pounds, in tank cars, at works.

SALT CAKE—Demand for salt cake is still persistent. Prices are steady to firm. Salt cake is quoted at from $12 to $13; chrome salt cake at from $11 to $12 per ton, at works; while imported salt cake is selling at from $12 to $13 per ton, ship side.

SODA ASH—The soda ash market is fairly active. Demand from the paper mills is moderately insistent. Prices are well maintained. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH—Paper mill demand for starch is normal and the contract movement is regular. Prices are now steady and unchanged. Special paper making starch is quoted at $4 per 100 pounds, in bags; and at $4.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA—The sulphate of alumina market is stronger. Contract shipments are moving in good volume. Commercial grades are quoted at from $1.25 to $1.60; while iron free is selling at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market is steady. Yearly contracts are quoted at $18 per long ton on orders of 1,000 tons, or over. On spot and nearby car loads the quotations are $21 per ton. All quotations are in car lots, at works.

TALC—Offering of talc are moving into consumption in moderate volume. In most instances prices are holding to schedule. Domestic talc is quoted at from $15 to $18 per ton, eastern mines; while imported talc is selling at from $23 to $30 per ton, on dock.

Market Quotations

Paper

Tissues—Per Ream—

White No. 1	1.10	@	—
White No. 1 M. G.	1.07½	@	—
White No. 1½	.77½	@	—
White No. 2	.75	@	—
Anti-Tarnish M. G.	.77½	@	—
Colored	.90	@	—
Kraft	.77½	@	—
Manila	.75	@	—
Unbleached Toilet	2.60	@	3.30
Bleached Toilet	3.94	@	5.26

Paper Towels—

Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70

Manila—

No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00

Fibre Papers—

No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—

Roll, contract	42.50	@	—
Sheets	47.50	@	—

Kraft—

No. 1 Northern	5.25	@	5.75
Standard	5.00	@	—
Southern	5.00	@	—
Glazed	4.50	@	—
Striped	4.75	@	—

Boards, per ton—

News	47.50	@	—
Chip	45.00	@	—
Sgl. Mia. Ll. Chip	55.00	@	—
Jute Lined Chip	55.00	@	—
Kraft Liners	65.00	@	—
White Pat. Coated	67.50	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$41.40@$48.50	$42.55@$50.00
100% Rag	32.80@ 38.50	33.95@ 39.75
85% Rag		32.20@ 37.75
75% Rag	24.75@ 29.00	25.90@ 30.50
65% Rag	21.65@ 26.25	22.80@ 27.75
50% Rag	18.70@ 22.75	19.90@ 24.25
25% Rag	15.80@ 19.25	16.95@ 20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$9.35@$11.50	$10.55@$12.75
No. 2	8.50@ 10.25	9.65@ 11.75
No. 4	7.60@ 9.25	8.80@ 10.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.45@	$14.25
No. 2 Glossy Coated	10.80@	12.25
No. 3 Glossy Coated	9.65@	11.00
No. 4 Glossy Coated	9.05@	10.50
No. 1 Antique (watermarked)	9.05@	10.50
No. 2 Offset	8.35@	9.50
A Grade E. F.	8.20@	9.50
A Grade S. & S. C.	8.45@	9.75
B Grade E. F.	7.60@	8.75
B Grade S. & S. C.	7.85@	9.00
C Grade E. F.	7.30@	8.50
C Grade S. & S. C.	7.55@	8.75
D Grade E. F.	7.00@	8.25
D Grade S. & S. C.	7.25@	8.50

Ivory & India at $.50 cwt. extra.

No. 3 White Linens	4.50	@	5.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—

Moist	35.00	@	36.00
Dry	40.00	@	42.00

(Delivered)

No. 1 Domestic and Canadian	36.00	@	37.50

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—

Prime Bleached Sulphite	3.25	@	4.65
Prime Qualities—Easy-Bleaching Sulphite	3.50	@	4.00
Strong Unbleached Sulphite	3.40	@	3.65

(On Dock, Atlantic Ports)

Kraft Bleached	4.00	@	4.75
Kraft Light & Strong	3.00	@	3.75
Kraft No. 1	2.90	@	3.65
Kraft No. 2	2.50	@	2.75

(F.o.b. Pulp Mill)

Kraft Domestic	2.75	@	3.25

(Delivered)

Soda Bleached	3.15	@	—

Add 60 cents per short ton. dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—New White, No. 1	9.00	@	9.25
Silesias, No. 1	6.75	@	7.00
New Unbleached	9.25	@	9.50
Blue Overall	7.50	@	8.00
Fancy	3.75	@	4.25
Washables	3.00	@	3.50
Mixed Khaki Cuttings	4.25	@	4.50
O. D. Khaki Cuttings	4.75	@	5.00

Old Rags

White, No. 1—Repacked	3.75	@	4.25
Miscellaneous	3.00	@	3.25
White, No. 2—Repacked	2.60	@	2.85
Miscellaneous	2.00	@	2.25
Thirds and Blues—Repacked	2.00	@	2.25
Miscellaneous	1.90	@	2.00
Roofing Rags—No. 1	Nominal		
No. 2	1.10	@	1.20
No. 3 (bagging)	.90	@	1.00
No. 4	.90	@	1.00
No. 5A	.75	@	.85

Foreign Rags

New Rags

New Dark Cuttings	Nominal
New Mixed Cuttings	Nominal
New Light Silesias	Nominal
Light Flannelettes	Nominal
New White Cuttings	Nominal
New Light Oxfords	Nominal
New Light Prints	Nominal

Old Rags

No. 1 White Linens	Nominal
No. 2 White Linens	Nominal
No. 3 White Linens	Nominal